343

CONTENTS

PROPERTY OF
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TRADE NAME	MODEL	SET AND FOLDER No.
Amplex	612 Recorder	343-2
Continental	C-45	343-3
Dewald	K-702B	343-4
Fisher	FM-40	343-5
Magnavox	Chassis AMP-151AA	343-6
McIntosh	C-4, C-4P	343-7
Motorola	Y21K54B, M, Y21K56B, M, Y21K57B, M, MCH, Y21K58B, M, Y21K59M, MCH, Y21T33BG, CH, MG, Y21T35B, M, Y21T36B, M, Y24K14B, M, Y24T6B, M, 21K54B, M, 21K56B, M, 21K57B, M, MCH, 21K58B, M, 21K59M, MCH, 21T33BG, CH, MG, 21T35B, M, 21T36B, M, 24K14B, M, 24T6B, M (Ch. TS-538, Y, VTS-538, Y, WTS-538, Y) Tel. Rec.	343-8
Motorola	6TAS8 Prod. Chg. Bul. 176	343-1
Packard-Bell	5R1	343-9
RCA Victor	8-PT-7030, T, 8-PT-7031, T, 8-PT-7032, T, 8-PT-7034, T (Ch. KCS100B, K) Tel. Rec. Prod. chg. Bul. 176	343-1
Sylvania	1102, GR, H, RE (Ch. 1-607-4)	343-10
Telefunken	"Elite"	343-11
Trav-ler	6300	343-12
Truetone	D2684A, D2685A	343-13
Truetone	D3614A	343-14
Truetone	2D2520A, B Tel. Rec.	343-15
Zenith	YP6B, YP6F	343-16
Zenith	Z400, Z402, Z404 (Ch. 4Z40, 4Z41)	343-17
Zenith	Z2220R, RU, Y, YU, Z2222C, CU, E, EU, R, RU, Y, YU, Z2247E, EU, H, HU, R, RU, Z2258E, EU, H, HU, R, RU, Z2282E, EU, R, RU, Z2637E, EU, R, RU, Y, YU, Z2672E, EU, R, RU, Z3000E, EU, R, RU, Z3004E, EU, R, RU, Z3006E, EU, R, RU, Z3008E, EU, R, RU, Z4000E, EU, R, RU (Ch. 17Z20, 17Z21, 17Z22, 17Z22Q, 17Z23, 17Z23Q) Tel. Rec.	343-18

Westinghouse

H 21S112A To 113B Ch. 2346- (V)
(V) 2356
H 21KR 115-114-116-113
H 21RU-112-113-114-115-116-
H 21T101B-107B-108B
H 21TU101A-107B-108B

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MOTOROLA MODEL 6TAS8

*****CORRECTION NOTICE*****

The IRC replacement listing for the volume and tone control (Part #18B537862) in the Motorola Model 6TAS8 was listed in error. (Photofact Set 333 — Folder 8).

The exact duplicate unit is IRC type QJ-1028A.

The Concentrikit Equivalent which was listed in error should have been as follows:

Kit K-6

Base Elements & Shafts .... B11-137, P17-129 (Panel)
B19-137X, R1-212 (Rear)

Switch 76-1

RCA VICTOR MODELS 8-PT-7030, 8-PT-7030T, 8-PT-7031, 8-PT-7031T, 8-PT-7032, 8-PT-7032T, 8-PT-7034, 8-PT-7034T (Ch. KCS100B, KCS100K)

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 14 IN SET 336

RCA Victor Models 8-PT-7030, 8-PT-7031, 8-PT-7032 and 8-PT-7034 (Ch. KCS100B) were covered in Photofact Folder 14—Set 336.

Models 8-PT-7030T, 8-PT-7031T, 8-PT-7032T and 8-PT-7034T (Ch. KCS100K) are added, along with late production changes, with the publication of this bulletin.

Ch. KCS100B
Ch. KCS100K

TUNER CHANGED

VHF tuner KRK55B is used in late production receivers. A schematic of the new tuner is given in Fig. 1. Alignment procedure is essentially the same as originally given.

Ch. KCS100K

COMPONENT CHANGES

V6, vertical multivibrator, output is changed from 6CG7 to 6CM7. A partial schematic showing the new circuit is given in Fig. 2.

T3, vertical output transformer, is changed to part #103266.

T4, deflection yoke, is changed to part #103267.

T2, horizontal output transformer, is changed to part #102985. A partial schematic showing the new circuit is given in Fig. 3.

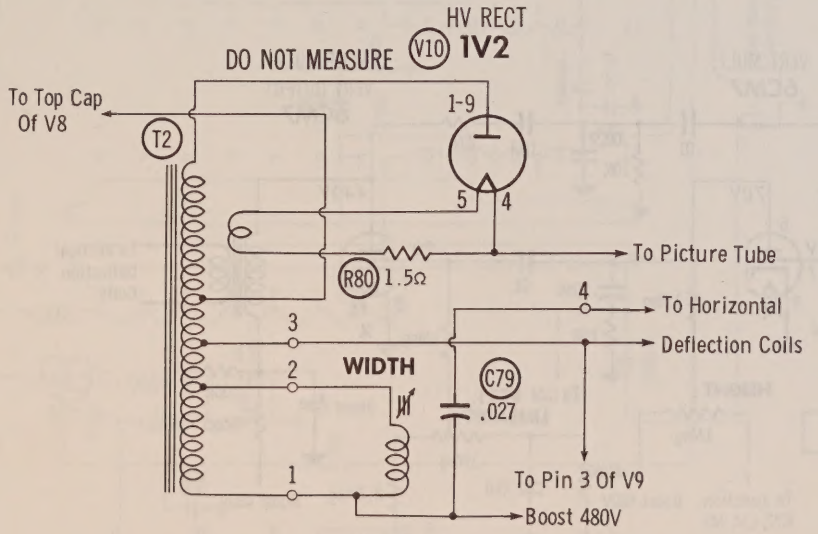

FIG. 3

PRODUCTION CHANGES
BULLETIN 176

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"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1957 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under international Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

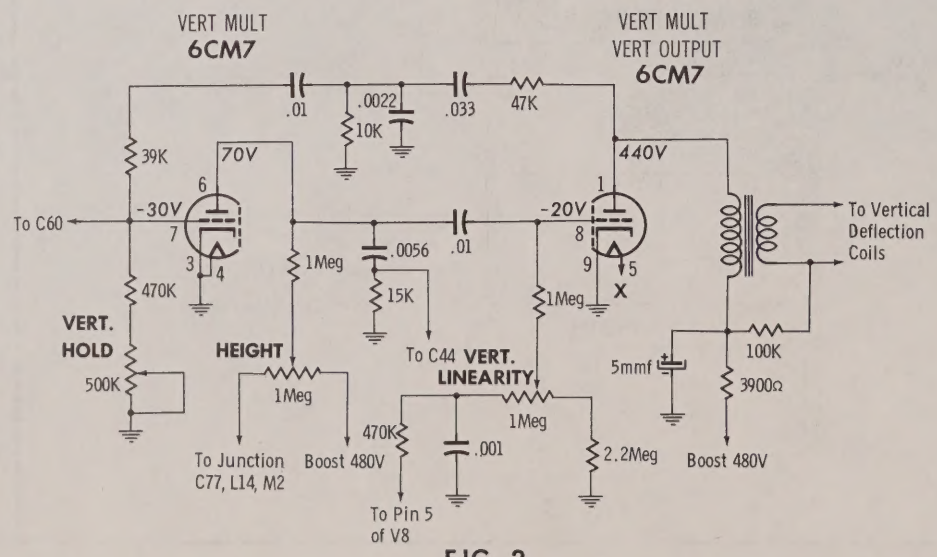
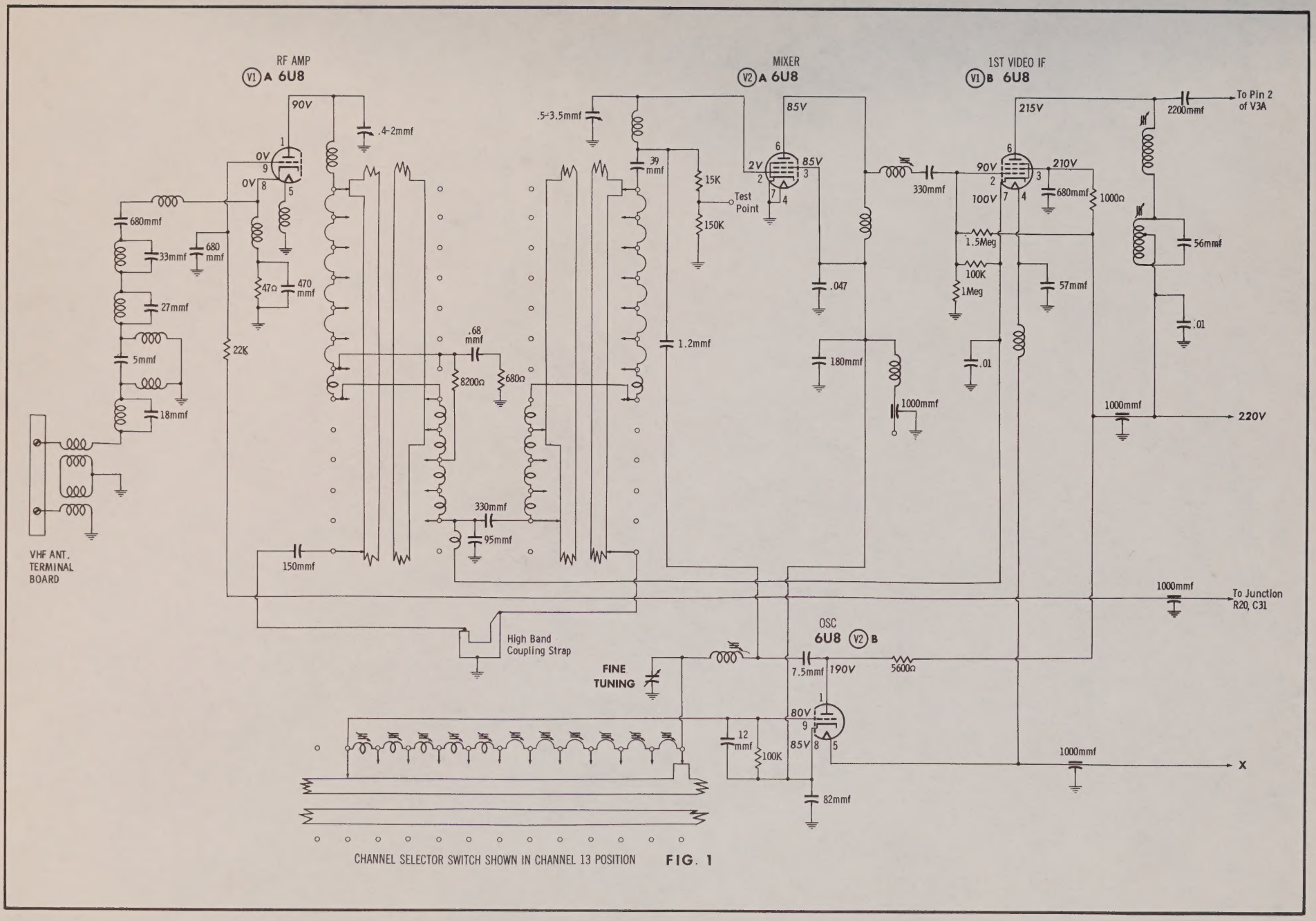
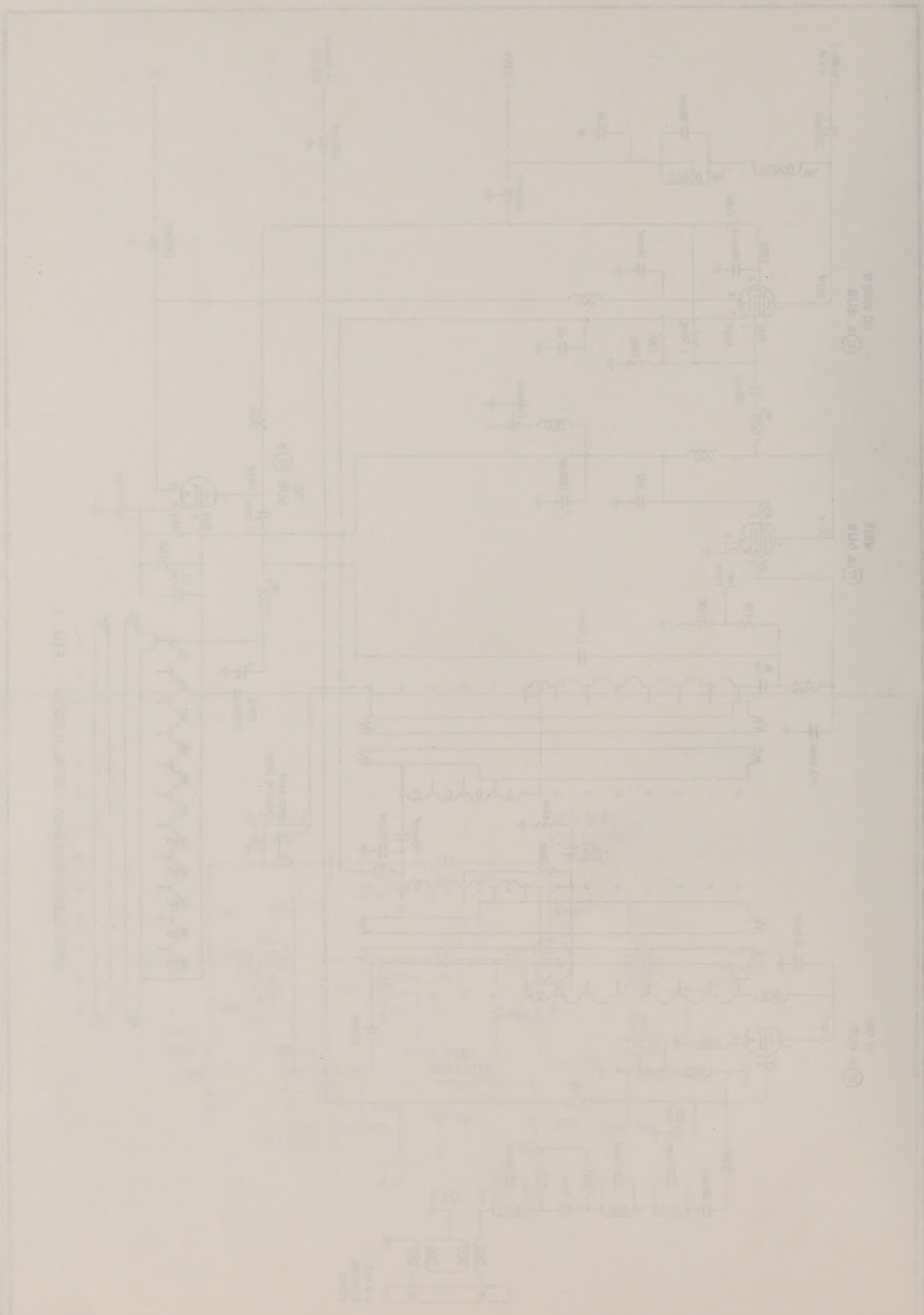

VERT MULT
6CM7
VERT MULT
VERT OUTPUT
6CM7
.01
.0022
10K
.033
47K
39K
70V
440V
6
1
-30V
-20V
To C60
7
8
3
4
9
5
X
.0056
.01
1Meg
15K
1Meg
470K
To Vertical
Deflection
Coils
VERT.
HOLD
500K
HEIGHT
1Meg
To C44 VERT.
LINEARITY
5mmf
100K
3900Ω
1Meg
470K
.001
2.2Meg
To Junction
C77, L14, M2
Boost 480V
To Pin 5
of V8
Boost 480V

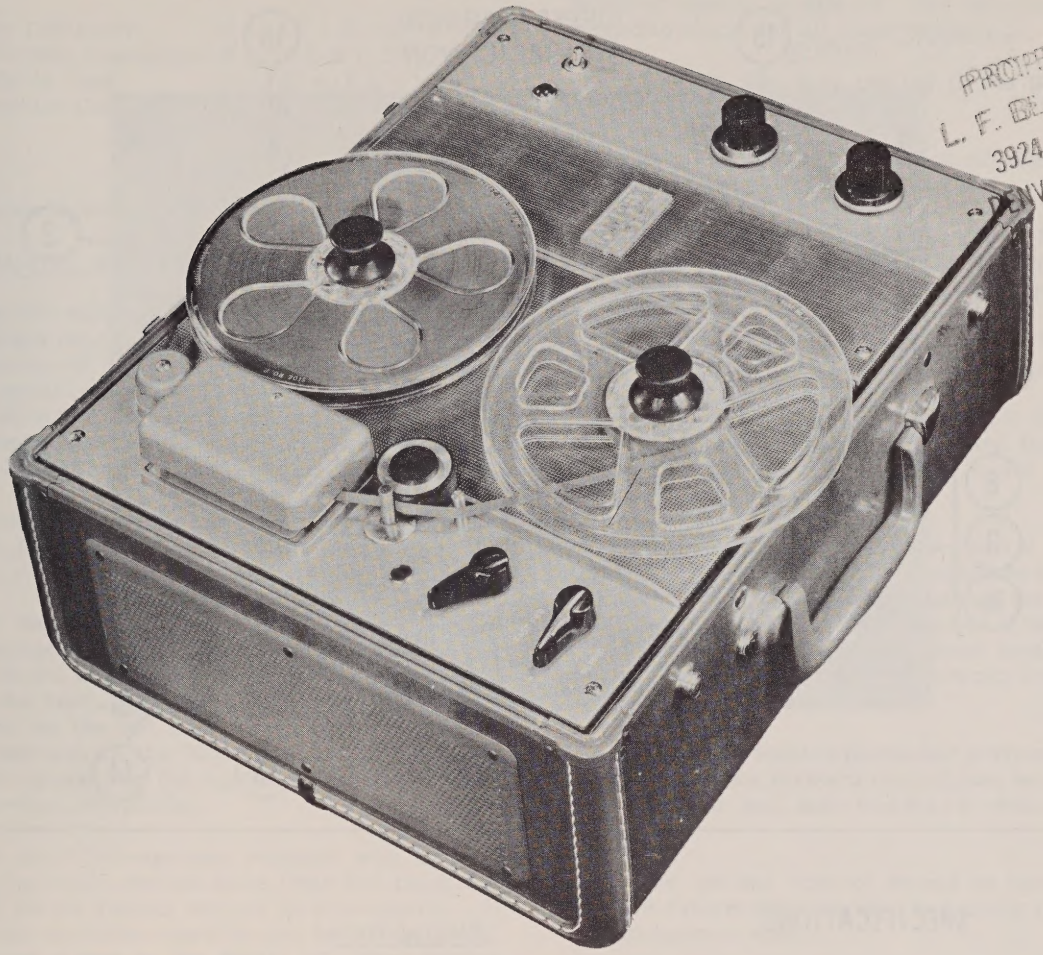
FIG. 2



CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION **FIG. 1**



RETMA MEMBER RADIO-ELECTRONICS-TELEVISION MANUFACTURERS ASSOCIATION



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AMPEX
MODEL 612

AMPEX
MODEL 612

GENERAL INFORMATION

The Ampex Model 612 Tape Phonograph is a tape playback machine which has been especially designed for the stereophonic reproduction of recorded magnetic tapes. The Model 612 is also capable of playing back both the conventional half track and full track recorded tapes.

The Model 612 is composed of a tape transport mechanism (with head assembly) and an electronic assembly. The transport mechanism handles 7 inch or smaller reels and operates at a tape speed of 7 1/2 inches per second. The head assembly contains a half track head for playing back both half and full track tapes and an "in-line" stereo head for reproducing two channel stereophonic tapes. Two identical but separate preamplifier channels are provided in the electronic assembly. When reproducing stereo tape, each of the channels picks up its original signal from a separate channel on the tape, amplifies it and feeds it to a separate output. The output of each channel may be fed to any high quality amplifier (and speaker) having an input impedance of 10,000 ohms or greater. Two Ampex Model 620 Amplifier Speaker units are suitable for this use.

MANUFACTURED by:
AMPEX CORPORATION
934 CHARTER STREET
REDWOOD CITY, CALIFORNIA

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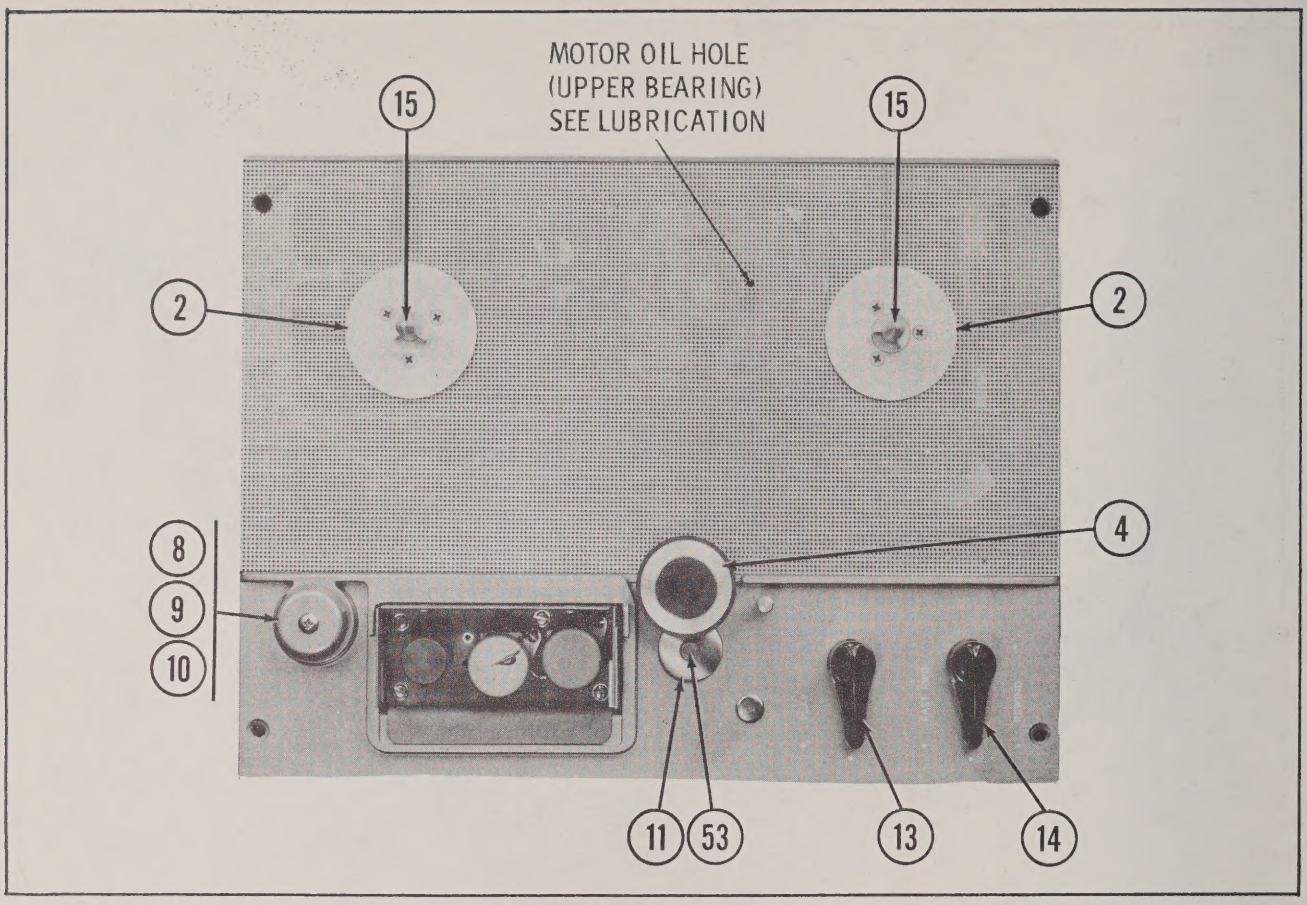

FIGURE 1

SPECIFICATIONS

Tape Speed-

7 1/2 inches per second.

Reel Size-

7 inch RTMA reel maximum.

Frequency Response-

40 to 15,000 cycles per second. The Model 612 is a reproducer only and frequency response must be relative to a standard. Will play back the Ampex standard tape (Stock No. 5563) within ± 2 db.

Signal To Noise Ratio-

50 db below a signal recorded at the level of 3% harmonic distortion (peak record level).

Flutter And Wow-

Below 0.25%.

Starting Time-

Tape accelerates to full speed in less than one second.

Stopping Time-

Less than one second when stopping from play mode.

Playing Time-

32 minutes for 7 inch 1200 foot reel.
48 minutes for 7 inch 1800 foot reel.

Fast Forward Or Rewind Time-

90 seconds for full 1200 foot reel.

Playback Timing Accuracy-

± 0.2% (± 3.6 seconds in a 30 minute recording).

Operating Modes-

Play, Fast Forward and Rewind.

Output-

1.25 volts RMS into a load of 10,000 ohms or greater (normal operating level).

Head Assembly-

Half track playback head for playback of half track and full track tapes. Dual track (in line) playback head for playback of two channel stereophonic tapes.

Power Requirements-

117 volts AC, 50 or 60 cycles. 0.45 amperes, 53 watts.

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Dimensions-

Tape Transport:	9 5/16" x 12 1/2" x 5".
Electronic Assembly:	6 1/8" x 12 1/2" x 5".
Portable Case:	16 1/2" x 13 3/4" x 8".
Furniture Cabinet:	17 1/2" x 15" x 9".

Weight-

28 pounds (with portable case).

INSTALLATION AND OPERATION

A power cable and two plugs (for connecting to Left and Right outputs) are supplied with the Model 612. Output cables, of sufficient length to connect to the separate amplifier-speaker systems, should be made with well shielded, low capacity cable. Output cables of the proper type are supplied with the Model 620 Amplifier-Speaker.

The input impedance of the two power amplifiers used with the Model 612 should be 10,000 ohms or higher.

Two amplifier-speaker systems must be used for stereophonic reproduction. One speaker must be placed to the left on one wall of the room and the other placed on the right. The input of the amplifier driving the speaker on the left must be connected to the Left output receptacle on the Model 612 and the amplifier driving the speaker on the right must be connected to the Right output receptacle.

Both amplifier-speaker systems will be used when playing single channel tapes (both full-track and half track) but the results will not be stereophonic. If desired, one amplifier-speaker can be disconnected, at the proper output on the Model 612, when playing single channel tapes.

1. After all connections have been completed, place a recorded tape on the supply reel turntable and an empty reel on the take-up reel turntable. Make certain that the turntable guides engage the drive slots on the reels.

2. Press a reel hold down knob (1) in place on each spindle.

3. Thread the tape as shown on Front Page.

(a) Around the left side of the tape guide.

(b) Through the head assembly (dull side of tape facing inward toward heads).

(c) Between the capstan and the capstan idler.

(d) In front of the guide post.

(e) And take a full turn counter clockwise around the hub of the empty reel.

It is not necessary to anchor the tape in the slot on the reel hub.

4. Make certain that the Play and Rewind - Fast Forward controls are in the neutral position and then place the Power switch in the On position.

5. Turn on both external amplifiers and allow them to warm up.

6. If stereophonic tape is to be played, turn the selector control to stereo. The selector control is turned to single for all other tapes.

7. Turn the play control to the play position. This starts the tape in motion.

The tape can be stopped at any time by turning the play control to its neutral position.

8. Set the volume control on the Model 612 to about 8 on its scale and adjust the volume controls on both amplifiers for the desired output levels.

The amplifier-speaker systems must be balanced and phased properly for satisfactory results.

9. To rewind the tape or move it rapidly in the forward direction, stop the tape and then place the rewind - fast forward control in the appropriate position.

The rewind - fast forward control and the play control are mechanically interlocked so that it is impossible to turn one of them unless the other is in neutral. This safety feature eliminates the possibility of tape breakage which would almost invariably occur if the machine were switched directly from either of the high speed modes to play.

To quickly locate a particular portion of the tape, the rewind - fast forward control may be shuttled between rewind and fast forward without stopping between.

The volume control should be turned down to mute the system while the tape is running in the rewind or fast forward mode.

TAPE TRANSPORT ASSEMBLY

The Model 612 tape transport mechanism utilizes a single - speed synchronous motor and a system of pulleys, belts and clutches to drive the capstan and turntables. Three modes of tape motion (play, rewind and fast forward) are determined by two controls located on the top panel of the tape transport assembly. (The neutral position of each control is marked by a dot).

Standby Operation-

Power is applied to the drive motor (59) when the power switch is turned to ON. The capstan (53) begins to rotate immediately, being driven by a nylon belt (58) which runs between the motor pulley (61) and the capstan flywheel (53). A second belt (54) running in a groove in the capstan flywheel drives the play takeup pulley (55). The shock relief brake rollers (73) are engaged against the rubber-tired fast forward and rewind clutches (30) and (48). Both turntables are motionless and the machine is in standby condition.

Since the capstan is in motion when the machine is in the standby condition, the tape will accelerate to full speed almost instantly when the play control is operated, thus producing a wow-free start.

Play Mode-

When the play control is turned to play the following mechanical sequence occurs:

1. The play takeup pulley (55) and belt (54) are brought to bear on the play takeup clutch (27).

2. The shock relief brake roller (73) on the play takeup side is released from the fast forward clutch tire (30).

3. The capstan idler (4) engages the capstan (53), which drives the tape, pulling it from the tape supply turntable (i.e. the rewind turntable) and feeding it to the takeup turntable, which now begins to rotate. It is especially important to understand that when the machine is operating normally in the play mode, in which the tape is clamped against the capstan by the capstan idler, the turntables are effectively isolated from each other. The takeup turntable, as its name implies, does nothing more than take up the tape fed to it by the capstan. It does not pull the tape from the tape supply turntable.

4. The shock relief brake roller (73) on the rewind side remains engaged against the rewind clutch tire (48) and slippage occurs between the clutch and the disc assembly (49). The friction produced in this slippage and the friction produced by the rewind holdback brake (44) operating on the bakelite drum (45) provide the required holdback tension.

Rewind Mode-

The rewind - fast forward control cannot be operated unless the play control is in neutral. When the rewind - fast forward control is turned to rewind:

1. Both shock relief brake rollers (73) are released.

2. The rewind idler (63) is clamped between the motor pulley (61) and the rewind clutch tire (48) and the rewind turntable is driven.

3. Holdback tension is provided by the holdback brake (23) on the takeup assembly as tape is pulled from the takeup turntable.

Fast Forward Mode-

When the rewind - fast forward control is turned to fast forward:

1. Both shock relief brake rollers (73) are released.

2. The rubber-tired fast forward clutch (30) is brought to bear on the motor pulley (61) and drives the takeup turntable.

3. Holdback tension is produced by the holdback brake (44) on the rewind assembly.

ROUTINE MAINTENANCE

Routine Maintenance of the tape transport mechanism consists primarily of periodic cleaning and lubrication.

Cleaning-

All surfaces that come in contact with the tape (tape guide, heads, capstan and capstan idler) should be cleaned regularly with ethyl alcohol applied with a soft, lint-free cloth. Particular attention should be given to cleaning the capstan idler and the capstan, both of which tend to pick up the lubricant with which most tape is impregnated. Failure to remove these accumulations may lead to slippage, flutter and wow.

Lubrication-

The following lubricants are recommended (available as part of Maintenance Kit, Stock No. 6392):

West of the Rockies - Cal. Oil OC, Turbine No. 11.
East of the Rockies - Gulfcrest A, Gulf Oil Co.

The upper and lower bearings of the drive motor should be lubricated after every 500 hours of operation. The upper oil hole of the motor is accessible through a hole in the tape transport grille slightly above and to the left of the takeup turntable (See Fig. 1). For access to the lower oil hole, located in the side of the motor end bell, remove the tape transport from the case.

Four or five drops of one of the recommended lubricants is sufficient. Care should be taken to avoid over-oiling or spills. Any such excess should be wiped away with a solvent.

The capstan may require oiling about once for every four oilings of the drive motor. For access to the upper bearing, the capstan idler (4) must first be removed. Remove the rubber cap on the idler. Remove the hair pin retainer and lift the idler off its shaft, taking care not to lose the washers associated with it. The aluminum plug-button over the capstan shaft may now be pried off and the felt washer beneath it removed to expose the upper capstan bearing. Use as much of one of the recommended lubricants as the bearing will accept, wipe away any excess, and reassemble.

CAUTION: Do not oil the felt washer which serves only as a dust protector and to keep oil from working its way up the capstan.

For access to the lower bearing, remove the tape transport from the case. The oil hole is located in the front of the capstan bearing housing. Use exactly four drops of oil - no more.

Do not oil any other parts of the tape transport mechanism. All other bearings and moving parts are lubricated for life.

MECHANICAL TROUBLE SHOOTING

Most of the difficulties encountered in the Model 612 tape transport mechanism will be traceable to contamination of belts, pulleys, bearings and other friction surfaces, whether due to carelessness in routine lubrication or to the gradual accumulation of dirt and other foreign material to be expected over a reasonable period of time. Correction of these difficulties will usually be a matter of careful disassembly and cleaning, rather than readjustments of the mechanism. The normal torques (and hence, tape tension) in this mechanism are fixed within strict design specifications and are not adjustable. The measurement of these torques will frequently provide a rapid means for isolating the sources of mechanical troubles.

Torques And Tape Tension-

The measurement of torques on the Model 612 requires the following equipment:

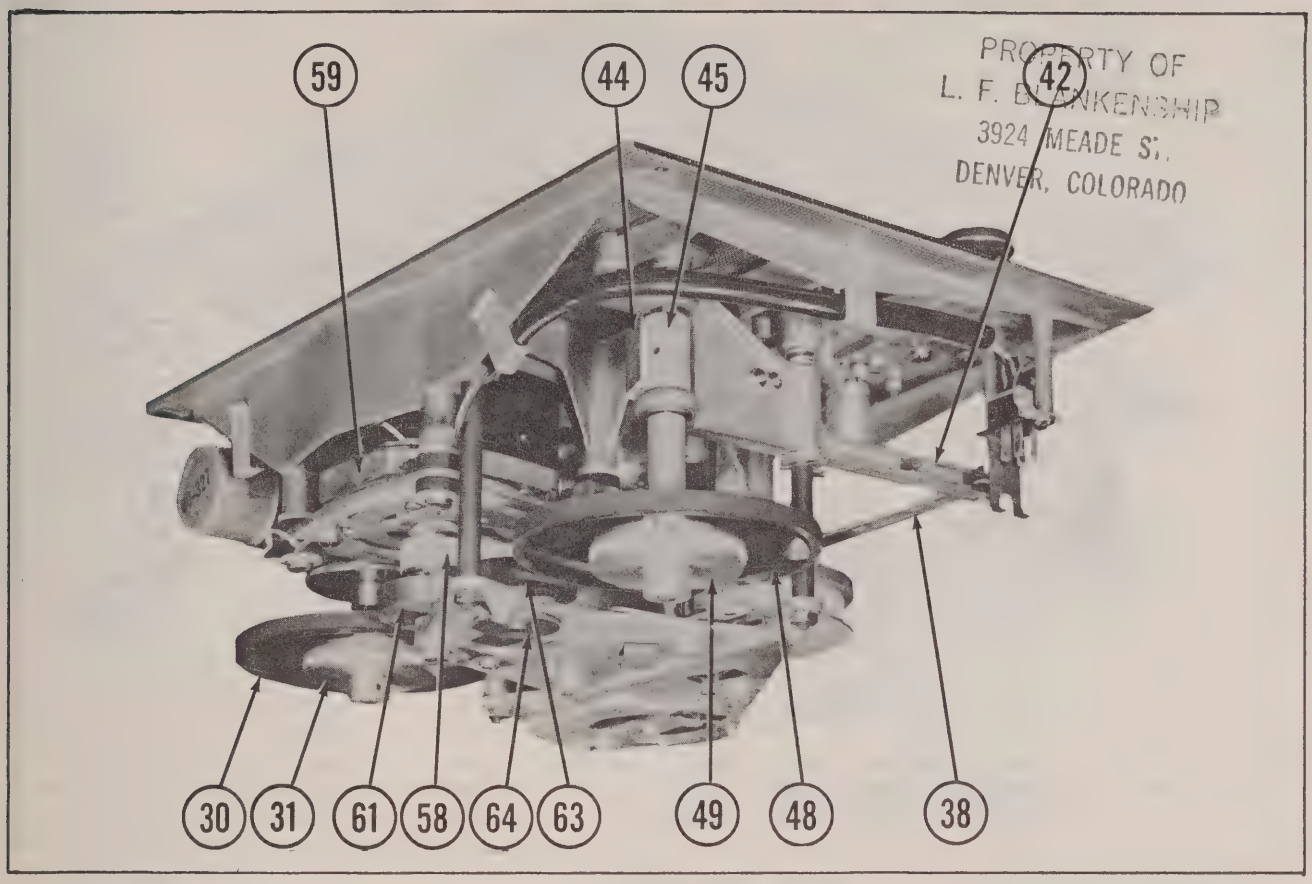

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FIGURE 2

1. A light-movement spring scale (Post-A-Let 0-8 oz., Exact Weight Scale Co., Columbus, Ohio).

2. A measuring hub. A standard RTMA plastic reel may be used. If the hub diameter is exactly 2 inches, the spring scale will read directly in ounce-inches. Reels with smaller hubs can be brought up to 2-inch diameter by winding on sufficient tape. If a reel of greater than 2-inch hub diameter is used, multiply the spring scale reading by the hub radius to obtain the ounce-inch reading.

3. A piece of string, approximately 30 inches long, with a small loop tied in one end.

Torques measured on the driven turntable in any mode (i.e. the turntable on which the tape is being wound) are a measure of takeup tension. Torques measured on the turntable from which the tape is pulled in any mode are a measure of holdback tension.

To measure takeup tension, place the measuring hub on the driven turntable. Wind a few turns of string around the hub in the direction of normal tape wrap and attach the spring scale to the loop at the end. Start the machine in the appropriate mode as the string is wound on the hub, allow the scale to move in with it, taking the reading while the scale is in motion. Normal takeup torques are as follows:

Fast Forward	5 to 7 oz. in.
Rewind	5 to 7 oz. in.
Play	2 to 3 1/2 oz. in.

To measure holdback tension, place the measuring hub on the turntable from which the tape is pulled in the mode in operation. Wind the string on fully in the direction of normal tape wrap and attach the spring scale. Start the machine in the appropriate mode and pull the scale slowly in the direction in which the tape is normally pulled from this reel, taking the reading while the scale is in steady motion. Normal holdback torques are as follows:

Fast Forward	3/4 to 1 1/4 oz. in.
Rewind	3/4 to 1 1/4 oz. in.
Play	5 3/4 to 8 3/4 oz. in.

Malfunctions In Play Mode-

Nearly all malfunctions in the play mode will be reflected as flutter and wow in excess of specifications. A quick check of takeup and holdback tensions may lead directly to the source of trouble.

The word contaminated, as used here; may indicate either the presence of oil where it is not wanted or accumulations of dirt and other foreign matter on pulleys and belts. In either case carbon tetrachloride is recommended as the cleaning agent. After cleaning a contaminated part, clean any other part with which it normally comes into contact whether or not that part shows any immediate evidence of contamination.

1. Excessive or erratic holdback tension.

A. Contaminated rewind clutch felt (49).

B. Contaminated rewind clutch tire (48).

C. Rewind clutch spring (47) too stiff. This usually indicates tampering or carelessness in re-

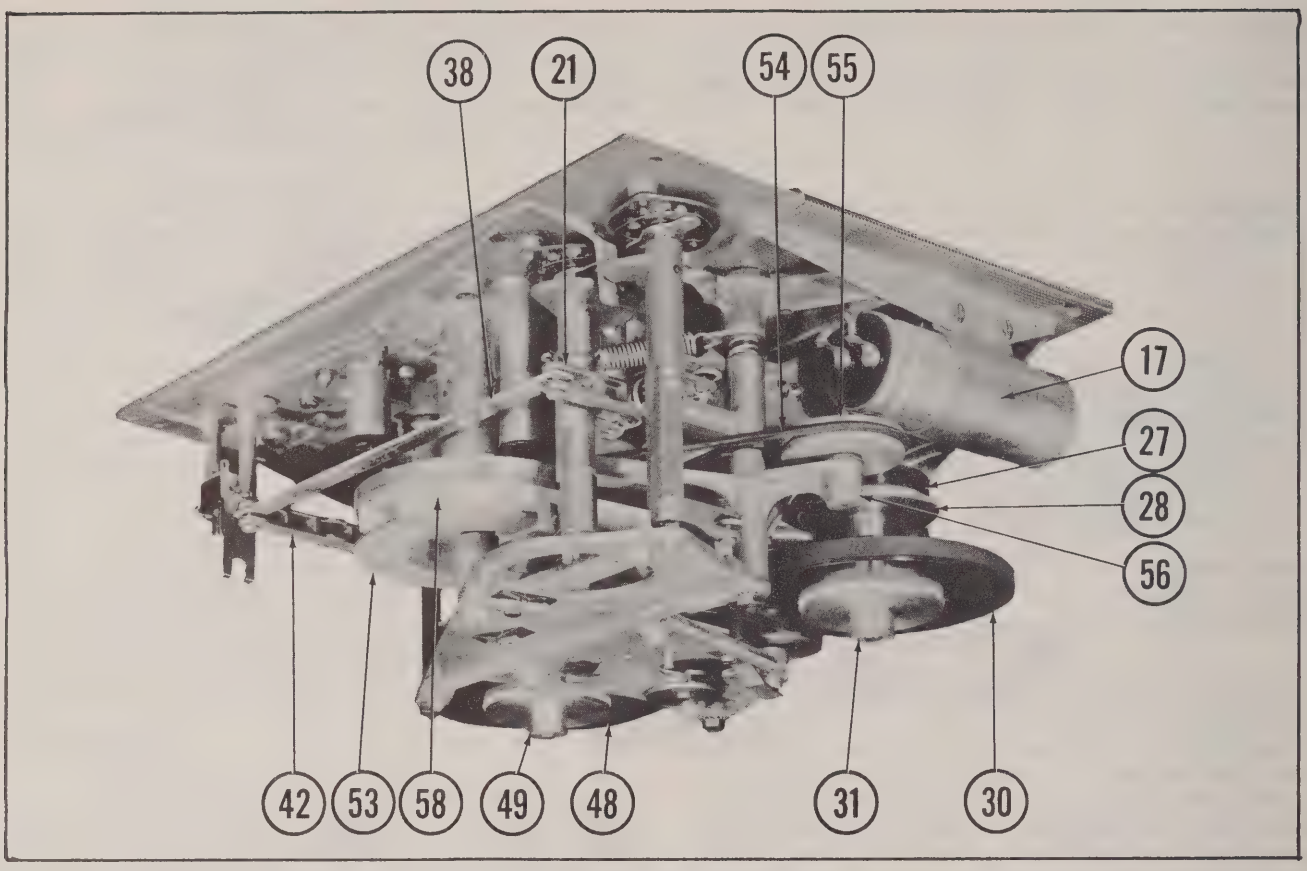

FIGURE 3

assembly. It is advisable to replace the spring rather than to attempt makeshift adjustment.

2. Excessive takeup tension.

A. Contaminated play takeup clutch felt (28).

B. Oilite bearing (25) bottoming on aluminum clutch disc (28). Minimum clearance should be .015". (See "Turntable Height Adjustment" for adjustment procedure).

C. Takeup clutch spring (29) too stiff. It is advisable to replace the spring rather than attempt readjustment.

3. Drive motor out of synchronism.

A. Line voltage below 105 volts AC.

B. Excessive play takeup tension. (See "2").

C. Nylon drive belt (58) tension excessive. (See "Drive Motor Centering").

D. Belt tensioning idler (37) dragging.

E. Drivemotor thrust misadjusted. (See "Drivemotor Thrust").

F. Defective drivemotor starting capacitor.

G. Dry bearings in drivemotor (59), capstan (53) or capstan idler (4). (See "Lubrication").

H. Defective drivemotor (59).

4. Flat or dented capstan idler tire.

A. If the capstan idler (4) is left engaged over an extended period when the machine is not operating, the idler tire may become dented. If running the machine in the play mode for several hours does not restore the tire to normal, the idler must be replaced.

5. Defective or improperly installed nylon drive belt (58).

A. Belt spliced improperly.

B. Belt installed with splice joint toward pulley.

C. Belt worn because misaligned motor pulley (61) causes the belt to track against one of the capstan pulley flanges (53).

6. Rewind idler (63) not disengaging from motor pulley (61).

7. Reels misaligned with respect to tape guides.

A. This will usually cause tape scrape which may or may not be audible but will generally appear as flutter. (See "Turntable Height").

Malfunctions In Rewind Or Fast Forward Modes-

Rewind and fast forward malfunctions will usually be reflected as an apparent loss of power in those modes, loose tape wind, erratic tape motion or slippage and possibly no rewind or fast forward at all. Make a quick check of rewind or fast forward torques as described under "Torques and Tape Tension". The malfunctions discussed below apply to either mode, the turntables, associated components and tape directions being opposite to each other.

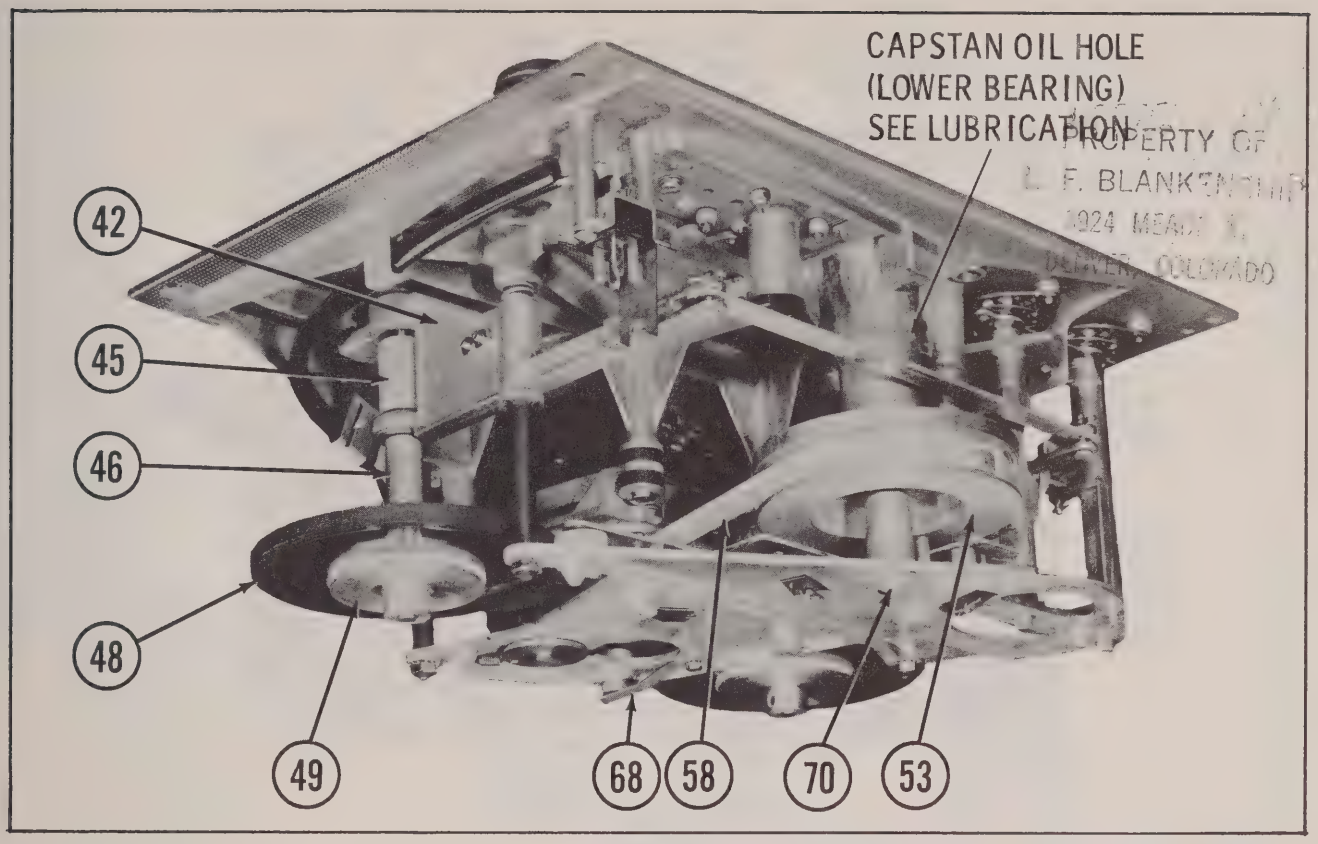

FIGURE 4

1. Takeup tension low.

A. Clutch leaf spring (29 or 47) too weak. Usually caused by tampering. Replace. Never attempt to increase rewind or takeup tension to offset other problems.

2. Excessive holdback tension.

A. Contaminated holdback wipes (23 or 44).

B. Bakelite drum (24 or 45) on which wipe operates has been roughened.

3. Brake shock relief roller (73) not releasing from fast forward clutch (30).

A. Evidence of bent or misassembled parts. (Check "Exploded View").

4. Contaminated clutch tire (30 or 48).

5. Rewind idler (63) not engaging motor pulley (61).

A. Bind in idler guide (64) due to contamination.

6. Malfunctioning turntable pivots (21 or 42).

A. Bind in turntable centering detent (41).

7. Bind in rewind idler bearing (63).

Starting, Stopping And Shuttling Malfunctions-

Starting, stopping and shuttling malfunctions will be evidenced by the throwing of tape loops and, in extreme cases, by tape breakage. These troubles are usually associated with low takeup tension or brake malfunctions produced primarily by tampering or misassembly, or due to careless oiling or accumulation of dirt.

1. Tape loop thrown on starting in play mode. (low play takeup tension).

A. Play takeup belt (54) contaminated.

B. Nylon drive belt (58) contaminated. If either the play takeup belt (54) or the nylon drive belt (58) is contaminated with oil, an over oiled motor or capstan is indicated. Clean all affected parts thoroughly with carbon tetrachloride.

C. Slippage between play takeup belt (54) and clutch (27) due either to weak play takeup arm spring (57) or bind in play takeup pulley bearing (55).

D. Bind in turntable shaft bearings (22 or 43) due to contamination. Clean and lubricate with two or three drops of medium weight oil.

E. Play takeup brake release (76) inoperative due to bind, weak or unattached spring (75) causing shock relief roller (73) to drag on fast forward clutch tire (30).

2. Tape loop thrown on stopping or shuttling.

A. One or both brake shock relief assemblies (73) binding.

B. One or both brake shock relief springs (74) off. End loops on these springs must be fully closed to prevent their becoming disconnected.

C. Bind in turntable centering detent (41).

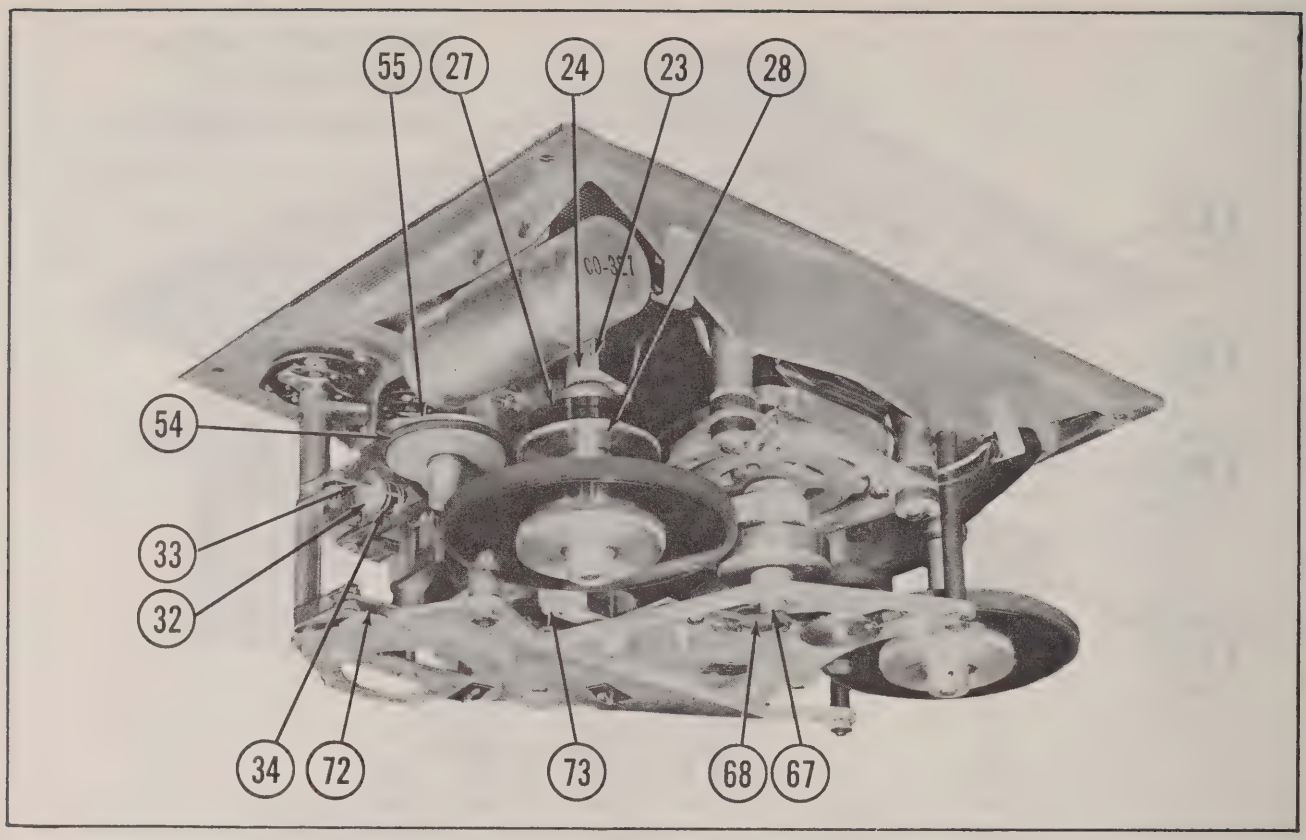

FIGURE 5

ADJUSTMENTS

The following section covers some adjustments, critical clearances and alignment which must be maintained in reassembling parts of the tape transport mechanism that may have been disassembled for servicing. Two general precautions should be observed in any required disassembly:

1. Always note the number, type and location of washers in an assembly very carefully. Should washers, retainers or other small hardward be lost or damaged in servicing, a kit containing an assortment of such hardware (Ampex Cat. No. 6392) is available through your Ampex dealer.

2. To remove the sub-plate (69), a preliminary to any further disassembly of parts under the top plate casting, remove only the three elastic stop-nuts that hold it and the clevis pin that links the slide lever (72) to the lower yoke of the rewind-fast forward actuator. It is unnecessary to remove the adjustment screw (70) for the capstan thrust. If the setting of this screw is changed, it must be carefully readjusted as described in the following sub-sections. The thrust disc (71) above this screw, being coated with grease, will usually stay in place when the sub-plate is removed. It is advisable, however, to be sure that it does not fall out. It will be easier to reinstall the sub-plate, after servicing, if the play control is placed in the "Play" position.

Drivemotor Centering-

The tape transport incorporates rubber shock mounts on the screws retaining the motor mounting plate to the top plate casting. These shock mounts provide automatic centering of the drivemotor and no adjustments are necessary.

Drivemotor Thrust-

The drivemotor thrust is a hardened steel ball (62) against a nylon disc (66). End thrust is regulated by a spring leaf acting against a thrust plunger. If drivemotor end play is present, replace the spring leaf.

NOTE: End play is present if the motor does not remain under spring tension.

Capstan Thrust-

The capstan thrust is a hardened steel ball against nylon disc (71). The capstan thrust is adjusted by set-screw (70). End play of .010" to .015" is required and obtained as follows:

1. Coat the nylon thrust disc (71) liberally with wheel bearing grease and drop it through the threaded hole in the sub-plate (69) over the capstan shaft.

2. Insert the set-screw (70) and tighten down until it is felt to bottom on the thrust disc (71). Grasp the capstan flywheel (53) between the thumb and index finger. While maintaining a slight downward pressure on the head of the set-screw with the screwdriver (to simulate the pressure that will later be applied by the locking screw) start backing the screw off slowly and work the capstan flywheel up and down until an audible click at the ends of its travel indicates the presence of end play. This will occur when the set-screw has been backed off approximately 1/4 of a turn. At this point, end play should be in the required range.

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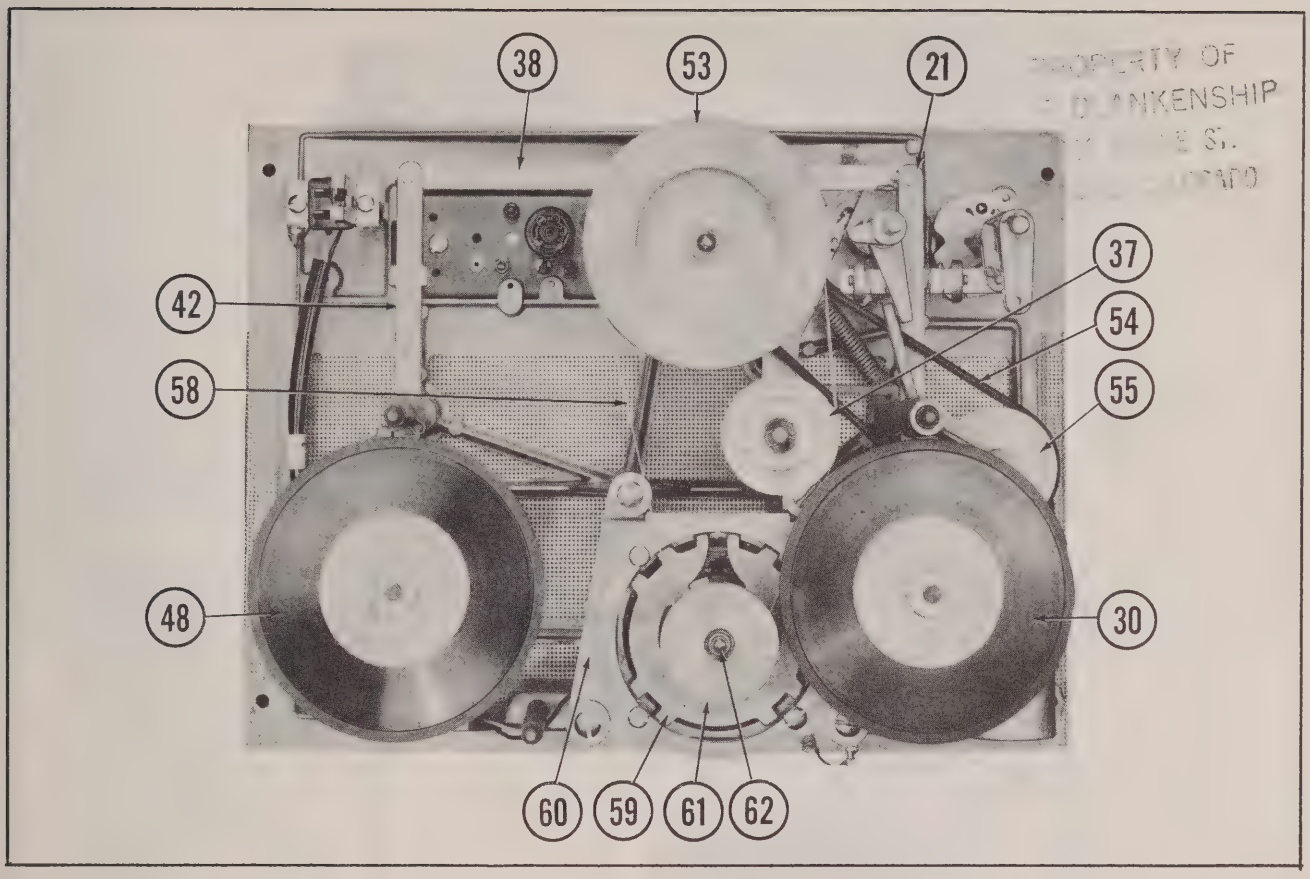


FIGURE 6

3. Tighten the locking nut on the set screw, then recheck end play.

Turntable Height-

Turntable height (the distance measured from the top surface of the turntable (2) to the perforated metal grille) should be .125" ± .008". This height is determined by the placement of lamicoid washers between the bottom of the turntable pivot (21 or 42) and the hair pin retainer on the shaft through the pivot. Difficulties with tape tracking that are traced to improper turntable height may be corrected by increasing or decreasing the number or thickness of these washers.

Play Takeup Clutch-

The play takeup clutch assembly consists of a felt-lined aluminum disc (28) and a bakelite clutch (27) which is spring-loaded to the disc. When the machine is in the play mode the clutch is driven by the rubber belt (54) on the play takeup pulley (55). Location of the felt-lined aluminum disc is critical, a clearance of .015" being required between the end of the oilite bearing (25) which goes through the bakelite clutch (27) and the bottom of the aluminum disc (28). This clearance, which cannot be measured directly with a gauge because of the physical arrangement, can be set quite accurately by the following indirect method:

1. Insert a removable .015" shim or feeler gauge between the thrust washer that rides on the inner race of the lower ball bearing (22) of the takeup turntable pivot (21) and oilite bushing (25).

2. Assemble the conical spring (26), the bakelite clutch (27) and the felt-lined aluminum disc (28) (in that order) on the turntable shaft (15).

3. Guide the end of the oilite bushing through the hole in the center of the bakelite clutch and press the aluminum disc down until it bottoms firmly on the end of the bushing.

4. Holding the disc in place, tighten the set screw in its hub.

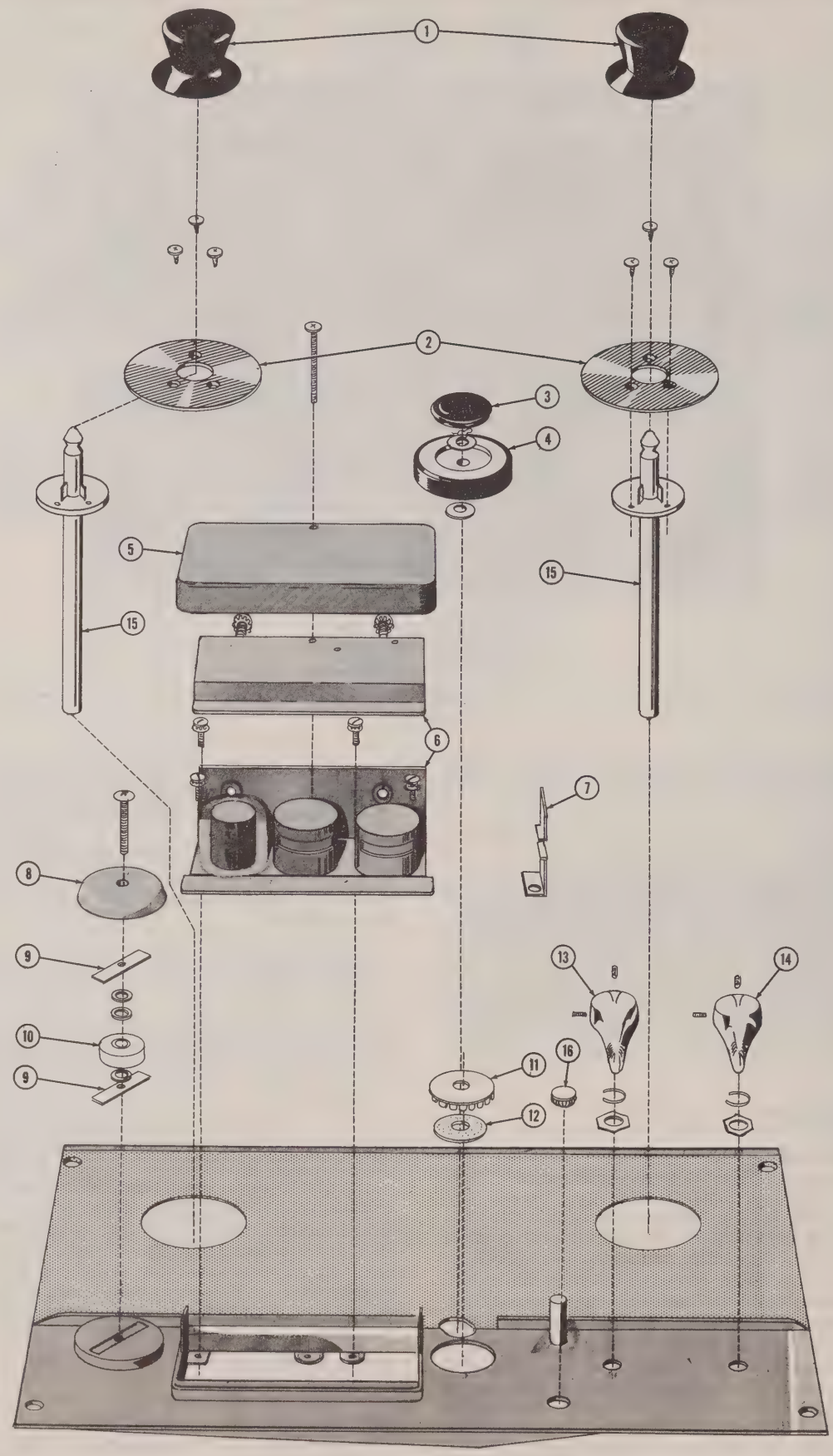
5. Remove the shim or gauge. The expansion of the conical spring will then force the oilite bushing back off the aluminum disc, thus creating the required .015" clearance.

Rewind And Fast Forward Clutch Alignment-

The rubber-tired bakelite rewind (48) and fast forward clutch (30) must line up with the shock relief brake assemblies (73) so that the rollers engage the full width of the tires. In addition, the rewind clutch (48) should be aligned for full-width contact with the rewind idler (63) and the fast forward clutch (30) for full width contact with the motor pulley (61).

Capstan Speed-

The capstan speed will not vary, since the capstan is driven by a non-slipping nylon belt and synchronous motor. No adjustment of the capstan speed will be necessary. If it is desired to check the capstan speed, use a pre-recorded 5000 cycle tape (that has been recorded on a machine of known accuracy) and an electronic frequency counter.



A PHOTOFACT "EXPLODED" VIEW
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FIGURE 7A. EXPLODED VIEW OF PARTS ABOVE BASEPLATE.

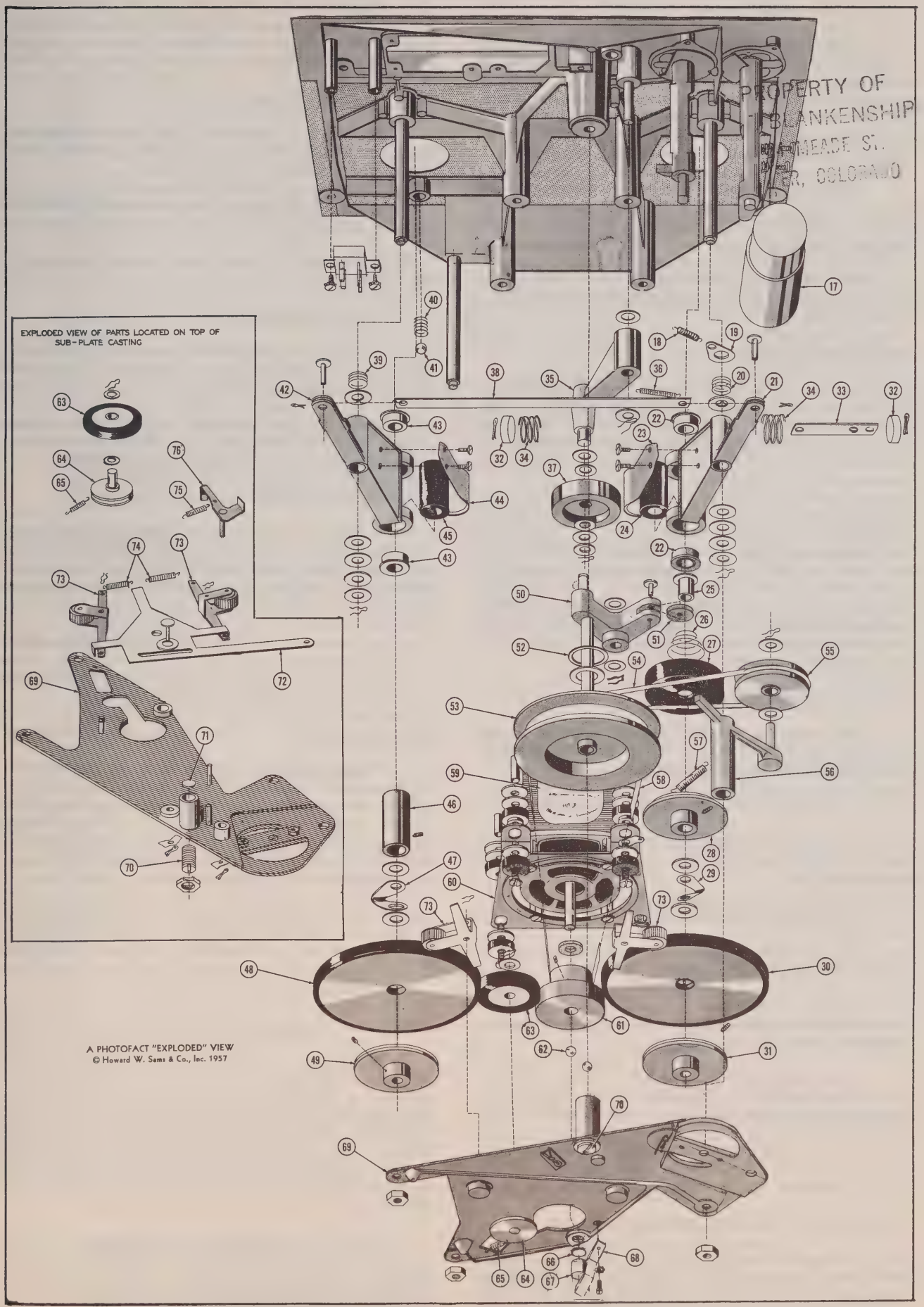

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FIGURE 7B. EXPLODED VIEW OF PARTS BELOW BASEPLATE.

PERFORMANCE CHECK

Each Model 612 is correctly aligned and adjusted at the factory just before shipment and will meet specifications given previously provided no shipping damage has occurred. Whenever there is any doubt concerning the performance of the Model 612, an overall performance check should be run to determine whether any adjustments are necessary.

Following is a list of definitions of terms which will be referred to in this section and the section on electronic alignment.

Normal Operating Level-

Approximately 1.25 volts RMS into 10,000 ohms. This is the point at which the maximum harmonic distortion is 1% at 400 cycles.

Peak Recording Level-

The level of 3% distortion per NARTB standards. The level at which 3% distortion occurs may vary considerably depending on the characteristics of the tape being used. For the purposes of this manual peak recording level is defined as 6 db above normal operating level.

Standard Tape-

An alignment tape (Ampex Stock No. 5563) which has been recorded at 7 1/2 inches per second and at 10 db below normal operating level. The No. 5563 tape contains voice announcements and the following sequence of tones: head alignment tone, reference tone for playback level adjustment and a series of tones for frequency response check.

Playback Response Check-

The check for playback response requires the use of an AC VTVM, a pair of high impedance headphones and a standard alignment tape.

1. Thread the standard tape on the machine.

2. Terminate either the Left or the Right output with a 10,000 ohm resistor and connect the VTVM across this load.

3. Connect the headphones across the output of the VTVM.

4. Set the selector control to Stereo.

5. Play the standard tape and monitor the headphones for the series of tones for playback frequency response check.

6. As each tone is picked up from the tape, note the output of the VTVM and check it against the response specifications as listed under Specifications.

7. Repeat the same procedure at the other output. When these steps have been completed, the frequency response from the stereo head has been checked.

8. Set the selector control on single.

9. Repeat steps 1 through 6 at either output. When these steps have been completed, the frequency response from the single-channel head has been checked.

If playback response fails to meet specifications, the trouble may be a worn, dirty or otherwise faulty head, a partially erased alignment tape (due to head magnetization) or improper equalization of the playback amplifier.

Signal-To-Noise Measurement-

The check for signal-to-noise ratio requires the use of an AC VTVM, a pair of high impedance headphones and a standard alignment tape.

1. Terminate either output with a 10,000 ohm resistor and connect the VTVM across this load.

2. Connect the headphones across the output of the VTVM.

3. Set the selector control on Stereo.

4. Play the standard tape and monitor the headphones for the second tone on the tape. This is the tone for playback level setting.

5. As the tone is picked up, adjust the volume control for a VTVM reading of 10 db below normal operating level (approximately 0.4 volts RMS).

6. Stop the tape.

7. With the power on but with no tape running, read the output on the VTVM. The readings should be no greater than 0.008 volts RMS, i.e., 44 db below normal operating level and 50 db below peak recording level.

8. Repeat steps 1 through 7 at the other output.

9. Set the selector control on single and repeat steps 1, 2 and 4 through 7 at either output.

Flutter And Wow-

Flutter and wow are produced by periodic irregularities in tape speed and appear as cyclic frequency deviations in recording or reproducing. They can be measured by playing back a 3,000 cycle tone with any standard flutter bridge connected across the correctly terminated output. Flutter at 7 1/2 inches per second should not exceed 0.25 per cent.

NOTE: Slow amplitude variations may occur in the course of measurement. These are the result of tape coating variations, poor head alignment or dirty heads and do not constitute flutter.

ELECTRONIC ALIGNMENT

Electronic alignment consists in making all adjustments necessary for proper electronic performance. A machine which is out of alignment may be characterized by poor frequency response, high noise, low output, high distortion or a combination of these faults. The overall performance checks (described in "Performance Checks") will generally serve to determine whether or not realignment is necessary at any time.

To set up the equipment for alignment, remove the four screws which hold the electronic in the case. Stand the case up and pull the electronic assembly forward. The interconnecting cables between the electronic assembly and the tape transport are long

enough to permit access to all adjustments on the electronic assembly without disconnecting the two units.

The minimum equipment required for complete alignment is as follows:

1. Audio Oscillator.

2. Vacuum Tube Voltmeter (VTVM).

3. Ampex Standard Alignment Tape (Ampex Stock No. 5563). See "Standard Tape" under "Performance Checks".

4. Ampex Head Demagnetizer (Ampex Stock No. 704).

5. High impedance headphones.

6. Small screwdriver.

NOTE: While not absolutely essential, an oscilloscope is a very valuable instrument for aligning. It may be used to monitor the output of the VTVM during measurements and will serve to show the presence of hum, noise and distortion which may be otherwise difficult to detect and which can cause erroneous VTVM readings.

Head Demagnetization-

It is always advisable to demagnetize the heads as a preliminary to aligning the machine. Magnetized heads will generally produce an increase of 5 to 10 db in noise level, distortion of the recorded signal and will gradually erase the high frequencies on any tape passed over them. Demagnetization procedure is as follows:

1. Remove the head cover and the mu metal shield over the head assembly.

2. Turn the power switch of the machine off.

3. Plug the demagnetizer into a source of 117 volt AC power.

4. The heads, from left to right when facing the head assembly, are half-track and stereo, respectively. Bring the tips of the demagnetizer as close as possible to, but preferably not in direct contact with, the half-track head. The tips of the demagnetizer should straddle the gap in the center of the head.

5. Run the tips slowly up and down the head several times and then withdraw the demagnetizer very slowly. This very slow withdrawal is required if complete demagnetization is to be achieved.

6. Repeat step 5 on the Stereo Head.

7. Replace the head shield. Do not replace the head cover if complete alignment, including head azimuth adjustment, is to be undertaken.

Head Azimuth Alignment-

1. Thread the standard alignment tape on the machine.

2. Remove the head assembly cover. It is not necessary to remove the mu metal shield.

3. Terminate the left output with a 10,000 ohm resistor and connect the VTVM across this load.

4. Connect a pair of high impedance headphones across the output of the VTVM. Do not connect the headphones across the input of the VTVM or the output of the amplifier.

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5. Set the selector control on single and start the tape into motion in the play mode.

6. Listen to the voice announcements on the headphones. The tone for head alignment will be the first one heard.

7. Insert a small screwdriver through the access hole near the center of the head shield and adjust the azimuth screw for maximum output as seen on the VTVM. When the azimuth screw has been set for maximum output the half-track head has been aligned.

NOTE: If the head is very far out of alignment several of the minor peaks which occur on either side of the maximum may be observed. The maximum, however, is clearly 15 to 20 db higher than any of these minor peaks.

8. Set the selector control on Stereo.

9. Insert the small screwdriver through the access hole near the right hand edge of the head shield and adjust the azimuth screw for maximum output as seen on the VTVM as described in step 7. When the azimuth screw has been set for maximum output, the stereo head has been aligned.

NOTE: Throughout the head alignment procedure, it may be necessary to rewind and play back the tape several times in order to repeat the head alignment tone.

10. Replace the head assembly cover.

Playback Level Matching-

1. Terminate the Right output with a 10,000 ohm resistor and connect the VTVM across this load. Set the selector control on Stereo.

2. Connect the headphones across the output of the VTVM.

3. Listen on the headphones for the second tone on the tape. This is the tone used for playback level setting.

4. As the tone is picked up, adjust the Volume Control for a VTVM reading of 10 db below normal operating level (approximately 0.4 volts RMS).

5. Terminate the Left output as described in Steps 1 and 2. Do not change the volume setting determined by Step 2.

6. By means of the Level Balance (a screwdriver adjustment on the underside of the electronic chassis) set the output to the same value of Step 4. The output of both channels will then be set to the proper level.

Frequency Response Check-

1. The next series of tones on the alignment tape is used for playback response checking. With the Left output terminated as in Step 5 in "Playback Level Matching", note the response indicated on the VTVM and check it against the specifications listed in "Specifications". If playback fails to meet specifi-

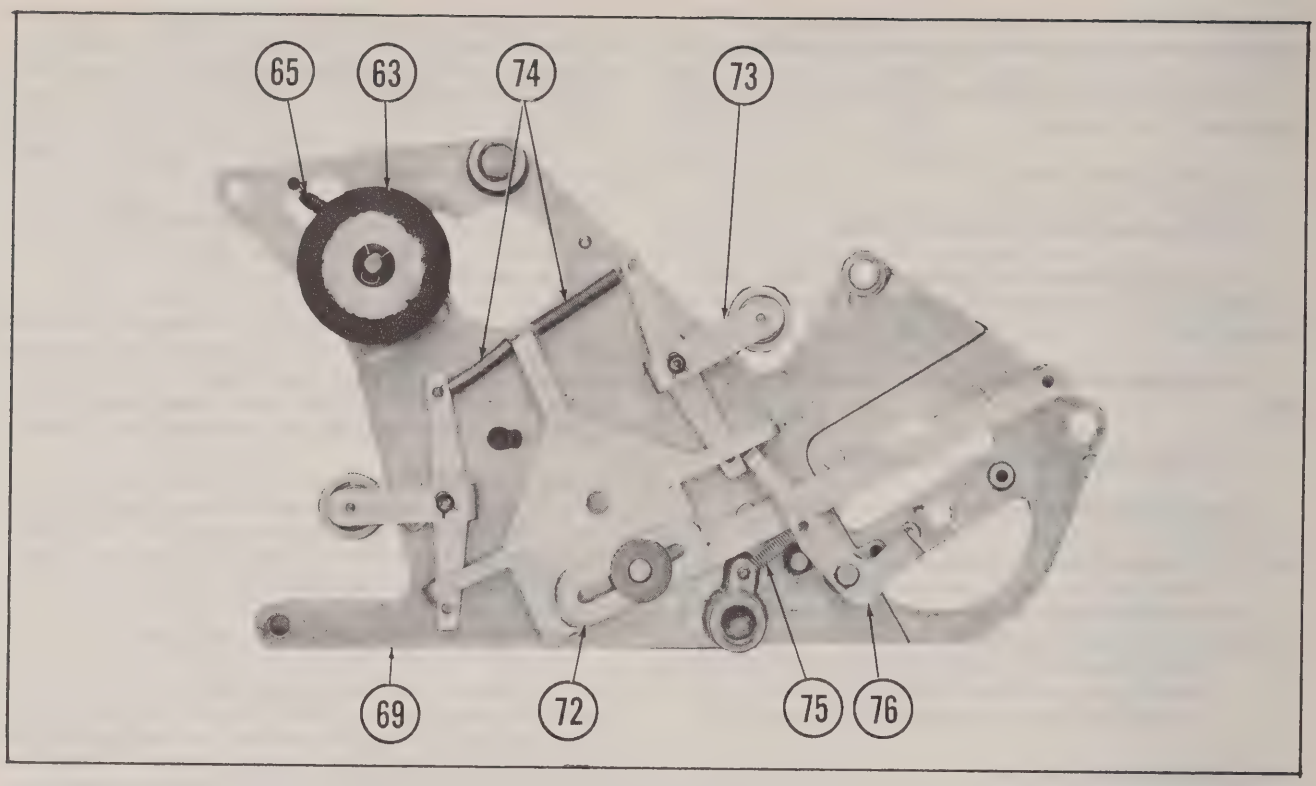

FIGURE 8

cations, the trouble may be a worn, dirty or otherwise faulty head, a partially erased alignment tape (due to head magnetization) or improper equalization of the playback amplifier.

2. Repeat the procedure of Step 1 at the Right output.

3. Repeat Step 1 with the selector control in the single position.

Playback Equalization-

1. Playback equalization is a bench procedure. Set up the test equipment as shown in Fig. 9. Headphones are not necessary.

2. Set the selector control on Stereo.

3. Terminate the Left output as shown in Fig. 9.

4. Connect the oscillator to pin 1 and 2 of the head cable connector. Pin 1 is ground.

5. Set the oscillator at 500 cycles and adjust its output for a VTVM reading 10 db below normal operating level (approximately 0.4 volts RMS) to establish a reference.

6. Increase the oscillator frequency to 8,000 cycles and adjust channel 1 equalization screwdriver adjustment to set response on the curve in Fig. 9 at that point.

7. Sweep the oscillator through the frequency range shown in the curve. Make certain that the output from the oscillator remains constant over this range. Response should follow the curve within $\pm$ 1/2 db. Channel No. 1 is then properly equalized.

8. Terminate the Right output as shown in Fig. 9.

9. Connect the oscillator to pins 3 and 4 of the head cable connector. Pin 3 is ground.

10. Complete Steps 5, 6 & 7, this time adjusting channel 2.

Equalization screwdriver adjustment to set the response on the curve in Fig. 9. Channel No. 2 is then properly equalized.

Hum Balance Adjustment-

1. After completing the foregoing adjustments as necessary, disconnect the oscillator and its external connections and re-connect the head cable and tape transport power cable.

2. Leave the selector control on Stereo and the external connections on the Right output.

3. With the power on but with no tape running, read the output on the VTVM and set the Hum Balance channel 2 screwdriver adjustment for minimum output.

NOTE: For most accurate setting of these controls the tape transport and electronic assembly should be either in the case or arranged in their proper respective positions on the bench. Strong external electric and magnetic fields can seriously influence the hum balance settings. Care should be taken to insure that these are minimized. A good check is to move the units around while observing the meter. If the hum balance is position-sensitive it is an indication of the influence of stray fields.

4. When the minimum balance is set, listen with headphones to the output of the VTVM and if possible observe with an oscilloscope. In this way, noisy or microphonic tubes can be detected.

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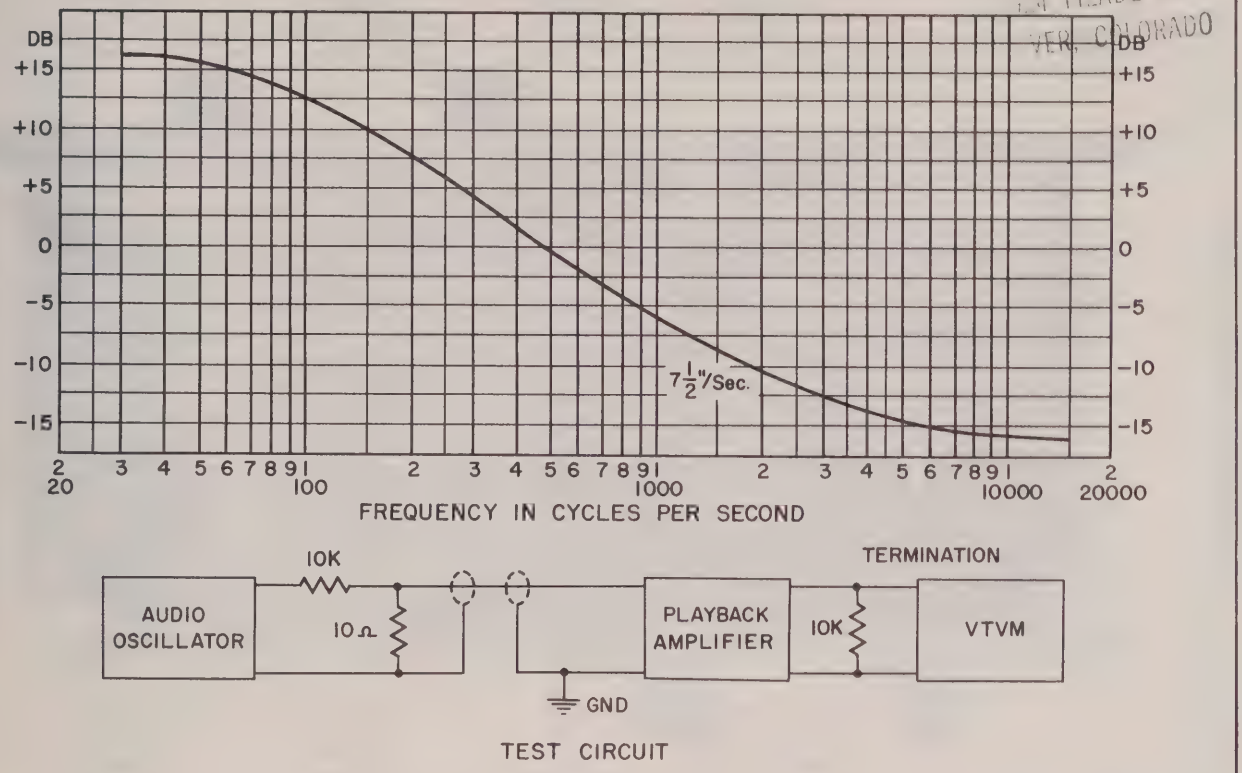


FIGURE 9

5. Move the 10,000 ohm resistor and VTVM to the Left output.

6. With power on but with no tape running, read the output on the VTVM and set the Hum Balance Channel 1 screwdriver adjustment for minimum output.

7. Repeat Step 4.

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	AF Amplifier	6F5	
V2	AF Amplifier	5879	
V3	AF Amplifier - Cathode Follower	12AU7	
V4	AF Amplifier	6F5	
V5	AF Amplifier	5879	
V6	AF Amplifier - Cathode Follower	12AU7	
V7	Rectifier	5Y3GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	AMPEX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	20	450	CO-65	AFH4-14	D0130	FP444	TMQ-12	Q-040	TVL-4763
B	▲20	450							
C	■20	450							
D	▲20	450							
C2	250	3	CO-508 Note #1	PRS6V250	BRH6025		TD-250-6	MTH-0625	TVA-1102
C3	50	25	CO-60	PRS25V50	BR502	TC29	TD-50-25	FM-0250	TVA-1206
C4	4	450	CO-54	PRS450V4	BR445	TC70	TD-4-450	FM-4504	TVA-1702
C5	250	3	CO-508 Note #2	PRS6V250	BRH6025	TC50025	TD-250-6	MTH-0625	TVA-1102
C6	4	450	CO-54	PRS450V4	BR445	TC70	TD-4-450	FM-4504	TVA-1702

Note #1. Chassis prior to Serial Number 5F0100 use 1000MFD in this application (Part No. CO-329).
Note #2. Not used in chassis prior to Serial Number 5F0100.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	AMPEX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C7	.047	400	CO-333							
C8	.022	400	CO-380	BPD-02	DD-203	CUB4S22	817-02	GEM-4122	4TM-S22	
C9	.047	400	CO-347	BPD-05	DF-503	CUB4S47		GEM-4147	4TM-S47	
C10	.047	400	CO-347	BPD-05	DF-503	CUB4S47		GEM-4147	4TM-S47	
C11	.047	400	CO-333							
C12	.022	400	CO-380	BPD-02	DD-203	CUB4S22	817-02	GEM-4122	4TM-S22	
C13	.047	400	CO-347	BPD-05	DF-503	CUB4S47		GEM-4147	4TM-S47	
C14	10000		CO-338	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AMPEX PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	250K	½	6254316	BB-103	AD47-250K-Z	Q13-130		Volume
B	250K	½				M13-130		Volume
C					FKS-1/4	Not Req.		Shaft (Attach to R1A)
R2A	10K	½	RE616	AB-15	A47-10K-Z	Q13-116	U18	Equalization Channel 2
B				AK-1	FKS-1/4	SQ	Not Req.	Shaft (Attach to R2A)
R3A	10K	½	RE616	AB-15	A47-10K-Z	Q13-116	U18	Equalization Channel 1
B				AK-1	FKS-1/4	SQ	Not Req.	Shaft (Attach to R3A)
R4A	250K	½	RE614	AB-51	A47-250K-Z	Q13-130	U44	Level Balance
B				AK-1	FKS-1/4	SQ	Not Req.	Shaft (Attach to R4A)
R5A	100Ω	2www	RE618		A43100	WPK100	R100L	Hum Balance Channel 2
B					FKS-1/4	Not Req.	Not Req.	Shaft (Attach to R5A)
R6A	100Ω	2www	RE618		A43100	WPK100	R100L	Hum Balance Channel 1
B					FKS-1/4	Not Req.	Not Req.	Shaft (Attach to R6A)

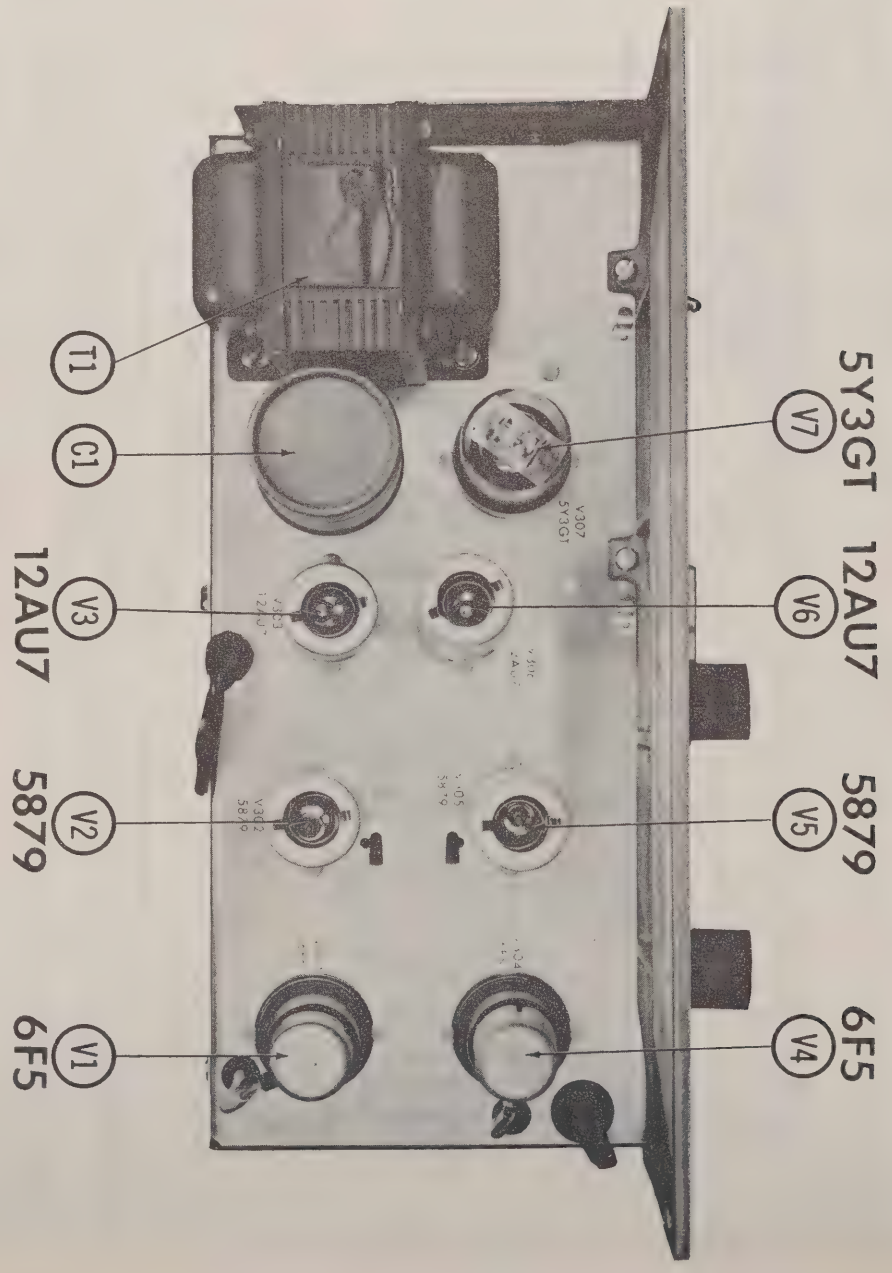
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AMPEX PART No.	IRC PART No.	
R7	330K		RE-427	BTS-330K	
R8	220K	1	RE-762		
R9	2200Ω		RE-369	BTS-2200	Note #1.
R10	1Meg.		RE-290	BTS-1Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AMPEX PART No.	IRC PART No.	
R11	100K	1	RE-761		
R12	100K	1	RE-761		
R13	82K		RE-764	BTS-82K	
R14	1000Ω		RE-448	BTS-1000	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AMPEX PART No.	IRC PART No.	
R15	47K		RE-299	BTS-47K	
R16	1500Ω		RE-332	BTS-1500	
R17	15K		RE-304	BTS-15K	
R18	1500Ω		RE-332	BTS-1500	
R19	47K		RE-299	BTS-47K	
R20	330K		RE-427	BTS-330K	
R21	220K	1	RE-762		
R22	2200Ω		RE-369	BTS-2200	Note #2
R23	1Meg		RE-290	BTS-1Meg	
R24	100K	1	RE-761		
R25	100K	1	RE-761		

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AMPEX PART No.	IRC PART No.	
R26	82K		RE-764	BTS-82K	
R27	270K		RE-297	BTS-270K	
R28	47K		RE-299	BTS-47K	
R29	1500Ω		RE-332	BTS-1500	
R30	1Meg		RE-290	BTS-1Meg	
R31	15K		RE-304	BTS-15K	
R32	1500Ω		RE-332	BTS-1500	
R33	47K		RE-299	BTS-47K	
R34	10K		RE-453	BTS-10K	
R35	2700Ω	2	RE-161	BTB-2700	
R36	2700Ω	2	RE-161	BTB-2700	

Note #1. A 1000Ω @ 1/2 W Resistor Used In Some Versions (Part # RE-448)
Note #2. Not Used In Chassis Prior To Serial Number 5F0100.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	AMPEX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .30A	520VCT @ .017A	5V @ 2A	6.3V @ .9A SEC 4 6.3V @ .8A	7753					

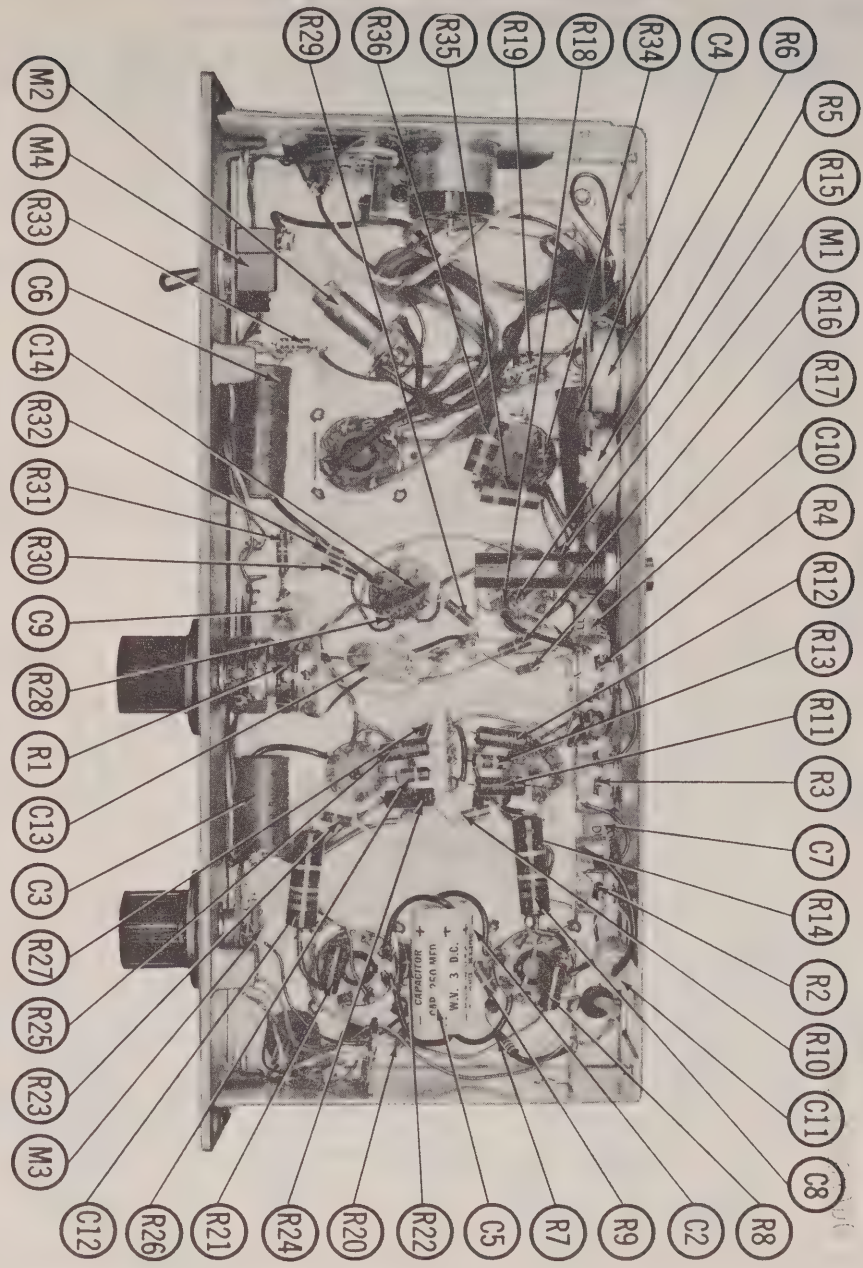
FUSES

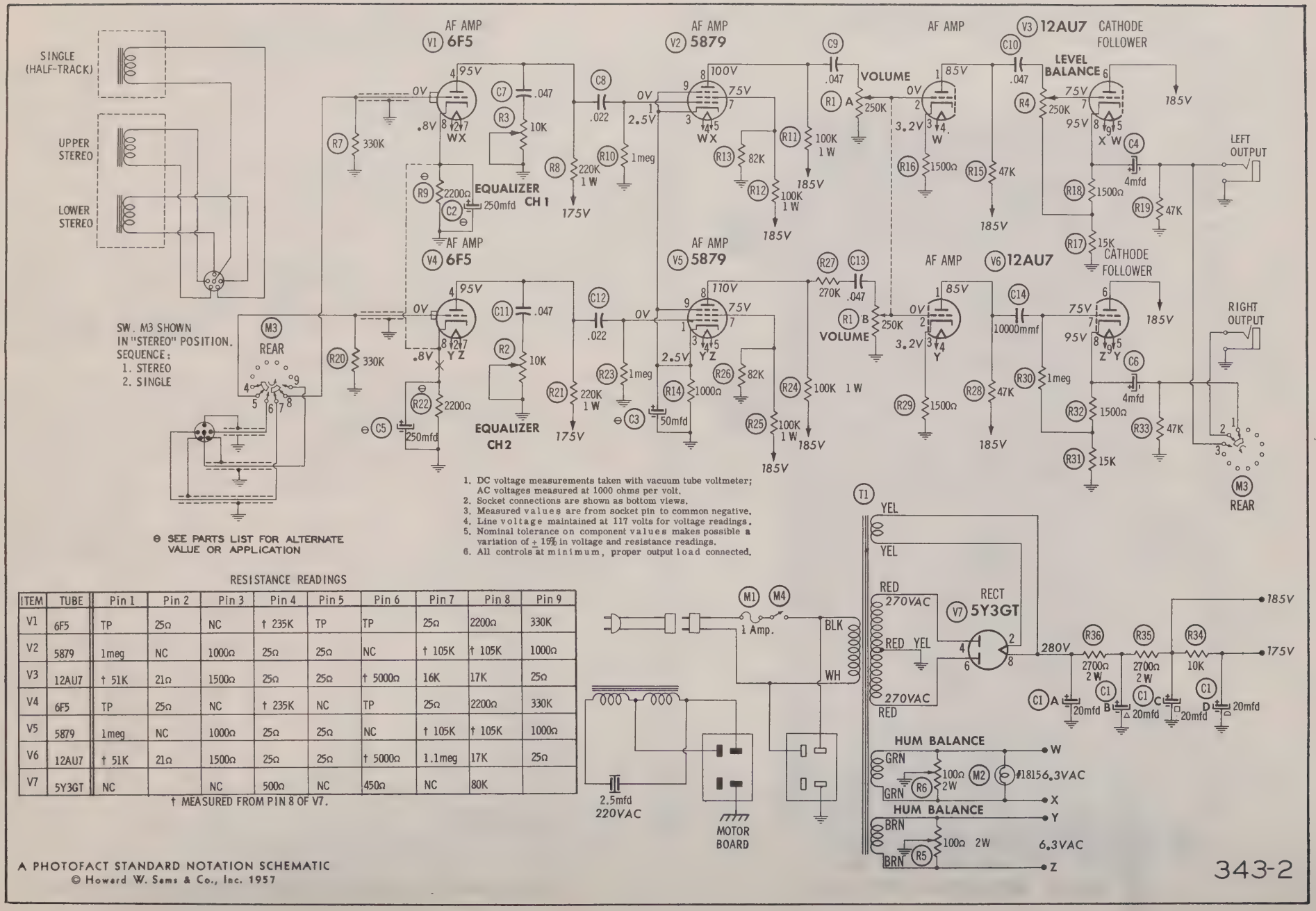
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			AMPEX PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	1A 250V	FU-1	FE-5	312001. (3AG 1A)	341001	AGC1	HKP

MISCELLANEOUS

ITEM No.	PART NAME	AMPEX PART No.	NOTES
M2	Pilot Light		#1815
M3	Switch	7756-2	Selector (3PDT Rotary, Wafer Type)
M4	Switch	SW-74	On-Off (Power) Toggle Type
	Knob	KN-14	2 Used (Selector & Volume)

CHASSIS—BOTTOM VIEW





1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6F5	TP	25Ω	NC	† 235K	TP	TP	25Ω	2200Ω	330K
V2	5879	1meg	NC	1000Ω	25Ω	25Ω	NC	† 105K	† 105K	1000Ω
V3	12AU7	† 51K	21Ω	1500Ω	25Ω	25Ω	† 5000Ω	16K	17K	25Ω
V4	6F5	TP	25Ω	NC	† 235K	NC	TP	25Ω	2200Ω	330K
V5	5879	1meg	NC	1000Ω	25Ω	25Ω	NC	† 105K	† 105K	1000Ω
V6	12AU7	† 51K	21Ω	1500Ω	25Ω	25Ω	† 5000Ω	1.1meg	17K	25Ω
V7	5Y3GT	NC		NC	500Ω	NC	450Ω	NC	80K	

† MEASURED FROM PIN 8 OF V7.

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343-2

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MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	6319	Reel Hold Down Knob	41	BC-21S	Steel Ball, 5/16", Detent, Rewind Arm
2	6205	Turntable	42	6243	Rewind Pivot Arm
3	6203	Cap — Capstan Idler	43	BC-34	Ball Bearing
4	6211-1	Capstan Idler (with oilite bearing)	44	6320-1	Holdback Brake Assembly
5	6207-2	Cover — Head Assembly	45	6293	Collar, "Drum"
6	12031-1	Head Assembly (1/2 track and 2 channel playback)	46	6316	Collar, Spacer
7	6208-1	Tape Guide (Head)	47	6246	Spring, Clutch "U"
8	6202-2	Cap, Tape Guide	48	6251-1	Clutch Assembly, Rewind (with oilite bearing)
9	6201	Bar, Tape Guide	49	6248-2	Disc Assembly (with large felt)
10	BC-8	Ball Bearing, Tape Guide	50	6236-1	Capstan Arm Sub-Assembly
11	6273	Cap, Dust Shield, Capstan	51	6237	Roller, Capstan Arm Sub-Assembly
12	6219	Dust Seal, Capstan, Felt	52	6262	Felt Washer, Capstan
13	KN-7	Play Knob	53	9353-1	Capstan Assembly, With Flywheel, Shaft & Ball
14	KN-7	Rewind — Fast Forward Knob	54	OR-10	Takeup Belt, Rubber "O" Ring
15	6244-1	Hub (with shaft)	55	6268-1	Pulley Assembly, Play Takeup Arm (with oilite bearing)
16	PB2-5/16	Plug Button	56	6270-1	Arm Assembly, Takeup
17	BR-20	Capacitor Bracket	57	6138	Spring, Takeup
18	6910	Spring, Capstan Idler Arm	58	2871-3	Drive Belt, Nylon, 60 CPS
19	6224	Anchor		2871-6	Drive Belt, Nylon, 50 CPS
20	6217	Turntable Height Spring, Takeup	59	6239	Motor
21	6243	Pivot Arm, Takeup	60	6240	Motor Mounting Plate
22	BC-34	Ball Bearing	61	6241-0	Motor Pulley, 60 CPS
23	6320-1	Holdback Brake Assembly		6241-1	Motor Pulley, 50 CPS
24	6293	Collar, "Drum"	62	BC-155	Ball 1/4", Motor Thrust
25	BB-13	Oilite Bearing	63	6285-1	Idler Wheel (with oilite bearing)
26	6137	Spring, Conical	64	6288-1	Guide Assembly, Idler
27	6247	Clutch, Play Takeup	65	6136	Spring, Rewind, Idler
28	6248-1	Disc Assembly (with small felt)	66	6934	Thrust Disc, Nylon
29	6246	Spring, Clutch "U"	67	7532	Plunger, Motor Thrust
30	6251-1	Clutch Assembly, Fast Forward (with oilite bearing)	68	7531	Spring, Motor Thrust
31	6248-2	Disc Assembly (with large felt)	69	6275	Sub-Plate Casting
32	6254	Washer, Spring Retaining, Cup	70	MS-32-27-1125	Special Set Screw, Capstan Thrust
33	6253	Link, Turntable Control		NU-16-616C	Hex Jam Nut, Capstan Thrust, 3/8"-27
34	6218	Spring Control	71	6934	Thrust Disc, Nylon
35	6264-1	Idler Arm Assembly	72	6277	Slide Lever, Brake Actuator
36	6216	Spring, Idler Arm	73	6279-1	Brake Shock Relief Ass'y.
37	9066-1	Idler Pulley Assembly (with oilite bearing)	74	9368	Spring, Actuator
38	6221	Link, Turntable Pivot	75	6215	Spring, Release Lever
39	6217	Turntable Height Spring, Rewind	76	6278	Release Lever, Play Mode Brake
40	6911	Spring, Detent, Rewind Arm			

DENVER, COLORADO

CONTINENTAL
MODEL C-45

CONTINENTAL
MODEL C-45

TRADE NAME	Continental Model C-45
SUPPLIER	Spiegel Inc., 1061 W. 35th St., Chicago 9, Ill.
TYPE SET	AC Operated AM Receiver With Electric Clock
TUBES (Four)	Types 12AU6 Converter, 12AV6 Det-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC - 60 Cycles
RATING	.25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC - 1630KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to antenna lug on tuning gang. Low side to B-.	455KC (400∿ Mod)	Tuning gang fully open.	Across voice coil.	A1, A2	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1630KC	"	"	A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	Tune to 1400KC signal.	"	A4	"

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PARTS LIST AND DESCRIPTIONS

CONTINENTAL MODEL C-45

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	12AU6	
V2	Det-AF Amp.	12AV6	
V3	Output	50C5	
V4	Rectifier	35W4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Continental PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	40	150	C-4429	PRS150/25V	BBRT4415C	TCT3116	TDL-442	FMT-327	TVA-3430
B	40	150		4040/20					
C	25	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Continental PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	47		C-4432	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C3	250		C-5033	SI250	D6-251	TP40	GP2K-251	UC-5325	5GA-T25	
C4	5000		C-4431	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C5	10000		C-5028	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C6	10000		C-5028	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C7	. 033	400		BPD-03	DF-303	CUB6S33		PT6133	6TM-S33	Note 1
C8	. 05	400	C-5030	BPD-05	DF-503	CUB4S5			4TM-S5	

Note 1: Some versions may use . 02MFD in this application. (Part #C-5029).

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Continental PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	2Meg	½	C-4507-2	B-76	A47-2Meg-Z	Q13-139	U55	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A

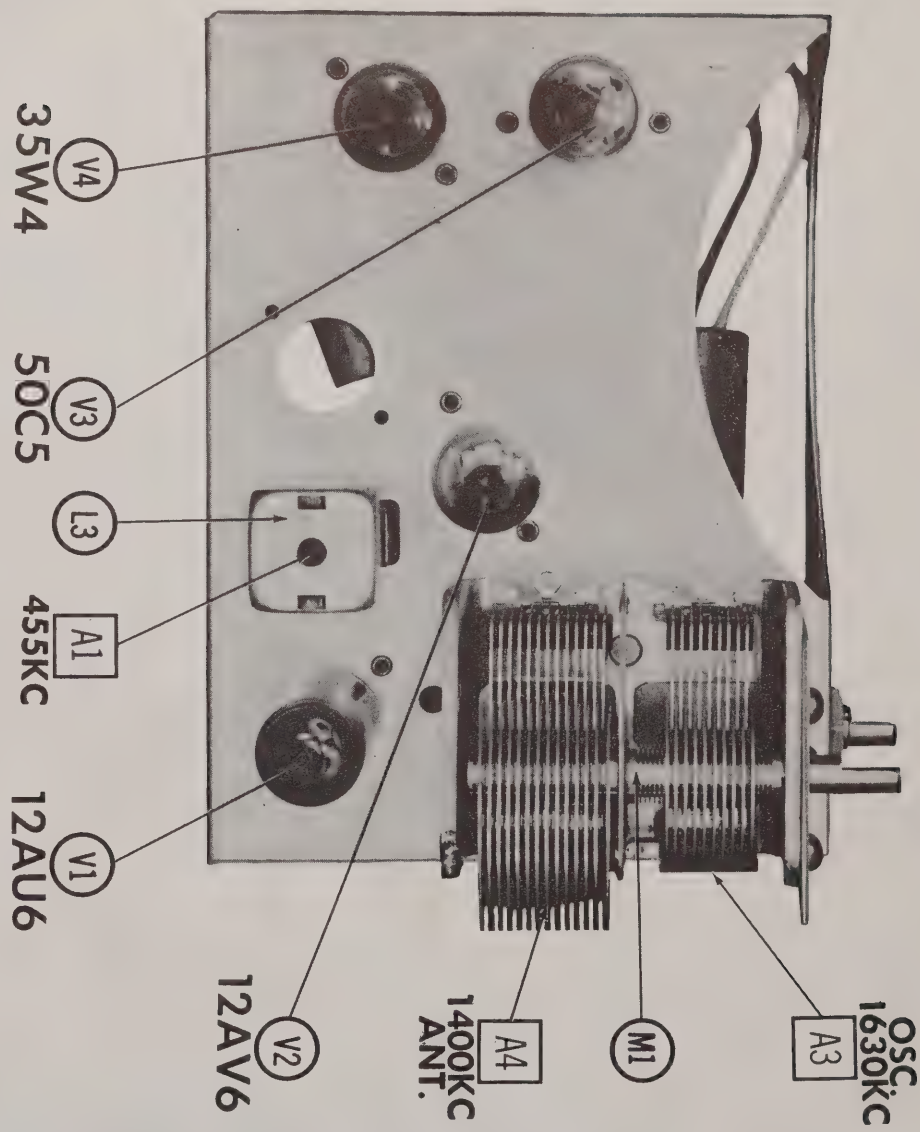
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Continental PART No.	IRC PART No.	
R2	2Meg		C-5021	BTS-2. 2Meg	
R3	6. 8Meg		C-5026	BTS-6. 8Meg	
R4	330K		C-1227	BTS-330K	
R5	470K		C-1228	BTS-470K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Continental PART No.	IRC PART No.	
R6	150Ω		C-5024	BTS-150	
R7	2200Ω		C-5027	BTS-2200	
R8	47Ω	1	C-4434	BTA-47	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Continental PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2800Ω	3-4Ω	Part of speaker. C-4406	Z1101 ①	A-3025①	A-3332 ①	26S58	S-12X ①	① Use original channel.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Continental PART No.	QUAM PART No.	RCA TYPE No.	
SP1	4"	PM	3-4Ω	C-4406	4A07	223S1	

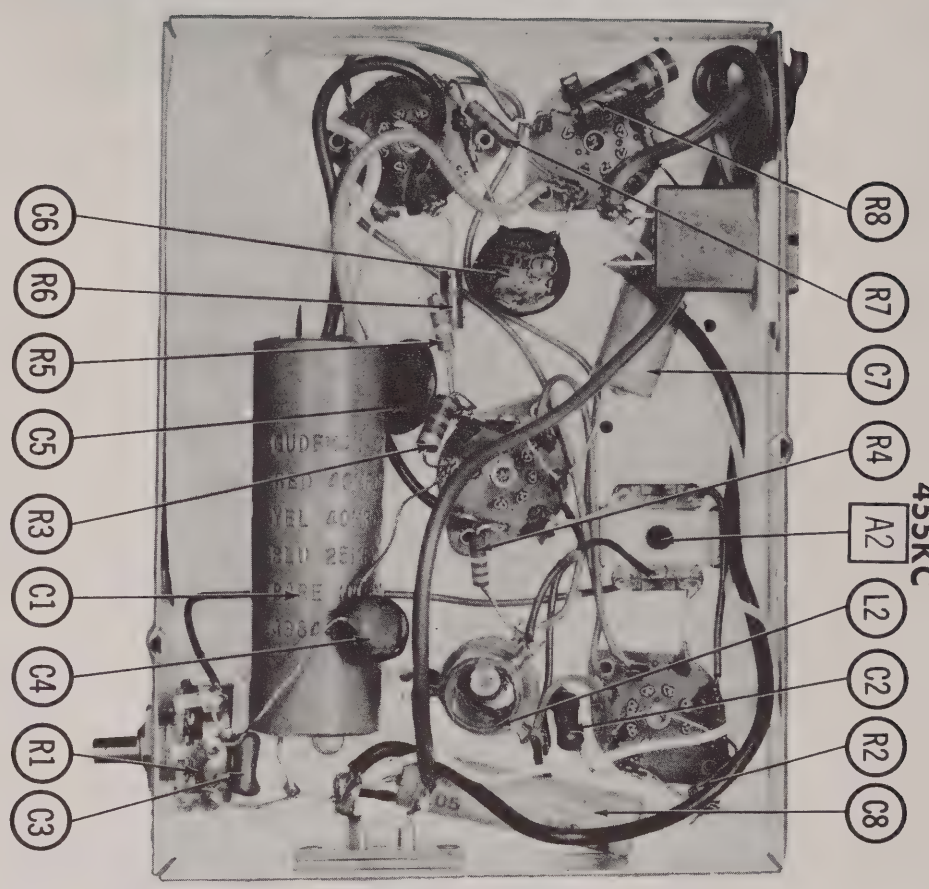
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Continental PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.1Ω		AS-C4514-2				
L2	Osc. Coil	1.3Ω	9Ω	C-4414				Tertiary winding = 2.7Ω
L3	IF Trans.	28Ω*	28Ω	C-4403				* Tap @ 1Ω

MISCELLANEOUS

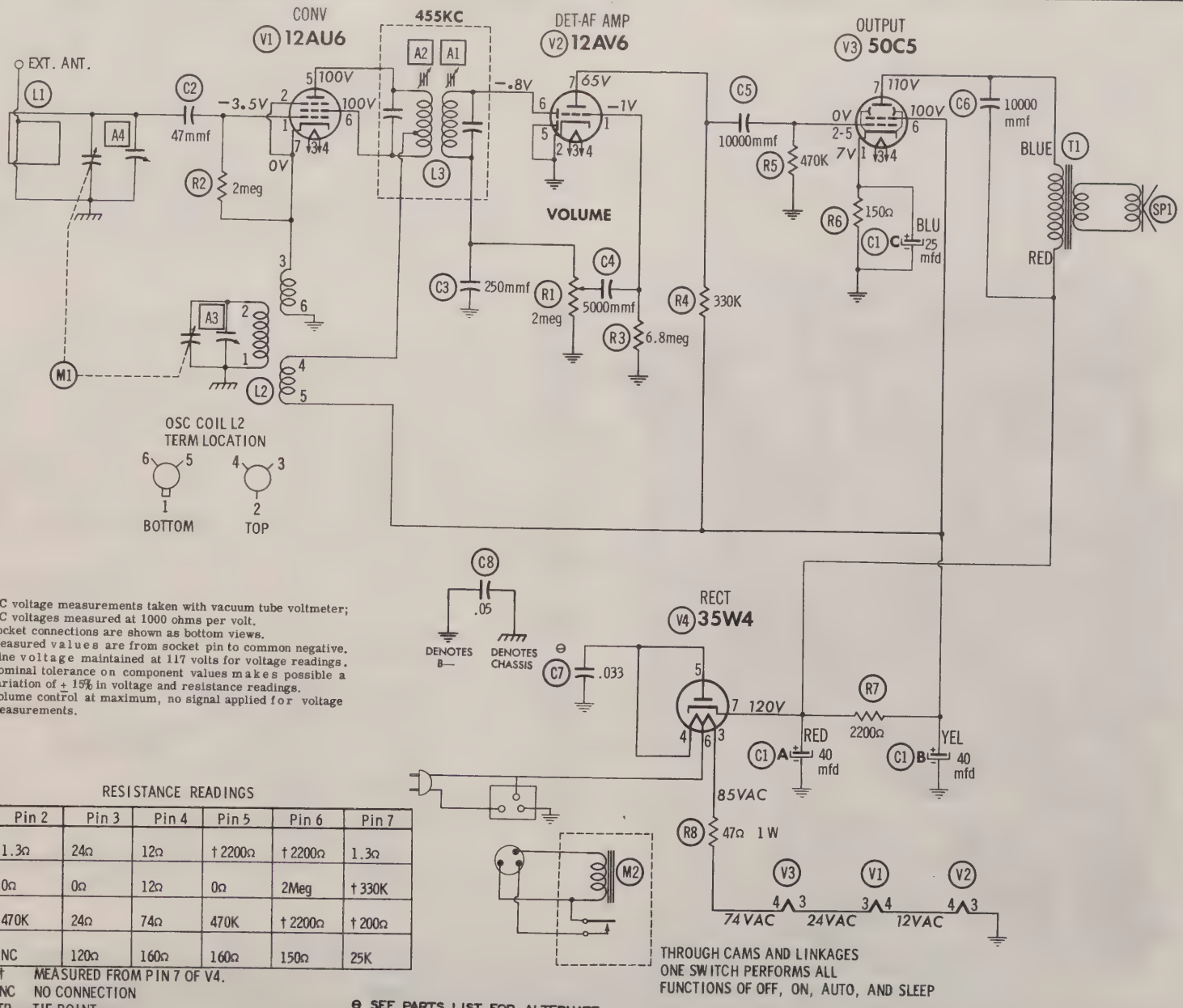
ITEM No.	PART NAME	Continental PART No.	NOTES
M1	Tuning Cap.	C-4502	2 Gang (26-495MMF, 20-190MMF)
M2	Clock	C-1216	
	Cabinet	C-4515	
	Knob	C-4517	Tuning
	Knob	C-4517-1	Volume

CHASSIS—BOTTOM VIEW



DENVER, COLORADO

CONTINENTAL MODEL C-45



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12AU6	2Meg	1.3Ω	24Ω	12Ω	† 2200Ω	† 2200Ω	1.3Ω
V2	12AV6	6.8Meg	0Ω	0Ω	12Ω	0Ω	2Meg	† 330K
V3	50C5	150Ω	470K	24Ω	74Ω	470K	† 2200Ω	† 200Ω
V4	35W4	TP	NC	120Ω	160Ω	160Ω	150Ω	25K

† MEASURED FROM PIN 7 OF V4.
NC NO CONNECTION
TP TIE POINT

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

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RETMA MEMBER

DEWALD MODEL K-702B

PROPERTY OF
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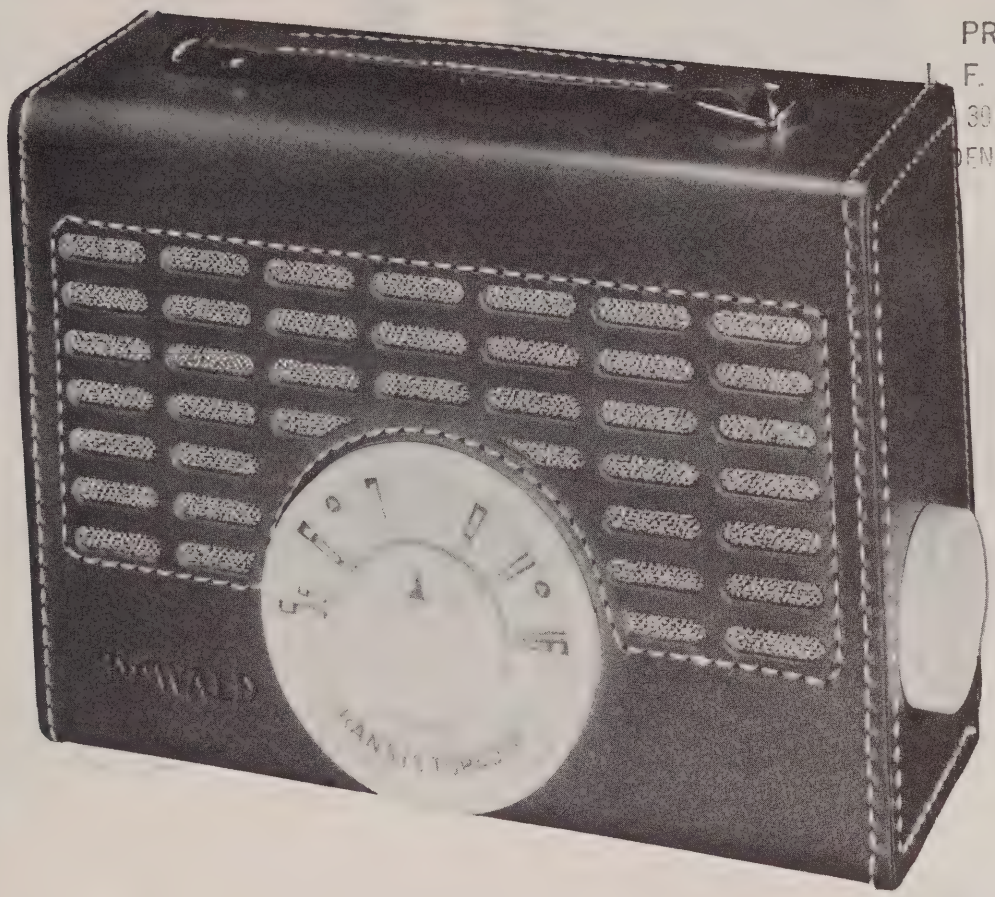
3024 MEADE ST.
DENVER, COLORADO

DEWALD
MODEL K-702B



DEWALD
MODEL K-702B

TRADE NAME	Dewald Model K-702B
MANUFACTURER	Dewald Radio Mfg. Co., 35-15 37th. Ave., Long Island City 1, N.Y.
TYPE SET	Battery Operated Portable Transistorized AM Receiver
POWER SUPPLY	9 Volts RATING 7.5 MA @ 9 Volts DC
TUNING RANGE--BROADCAST	540KC-1650KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to junction of L1 and C5. Low side to chassis.	455KC (400∿Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3	Adjust for maximum output.
2.		Loop	1650KC	"	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	Tune to 1400KC signal	"	A5	"
4.		"	600KC	Tune to 600KC signal	"	A6	Adjust for maximum output while rocking tuning gang. Repeat steps 2, 3 and 4 until no further improvement is obtained.

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PARTS LIST AND DESCRIPTIONS

DEWALD
MODEL K-702B

TRANSISTORS

ITEM No.	USE	TYPE	NOTES
X1	Converter	2N112	
X2	1st. IF Amplifier	2N112-A	
X3	2nd. IF Amplifier	2N112-A	
X4	AF Amplifier	2N132	
X5	Output	2N138	
X6	Output	2N138	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	DEWALD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	10	5	E-215-3	SRE25V10	BBR10-25		TD-10-25	MMT-0210	TE-1087
C2	2	10	E-218-1	PRS50V2	EC2-50		ML-2-15	MMT-4501	TVA-1201
C3	50	3	E-215-4	XPP3V50	BBR50-3		TD-50-6	MMT-350	TE-1100
C4	100	15	E-216-1	SRE15V100	BBR100-15	TC2501	TD-100-15	MTH-1510	TVA-1160

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	DEWALD PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C5	10000			BPD-01	DD-103	K082	ED-01	DC-511	5HK-S1	
C6	10000			BPD-01	DD-103	K082	ED-01	DC-511	5HK-S1	
C7	10000			BPD-01	DD-103	K082	ED-01	DC-511	5HK-S1	
C8	10000			BPD-01	DD-103	K082	ED-01	DC-511	5HK-S1	
C9	5.6									Note 1
C10	10000			BPD-01	DD-103	K082	ED-01	DC-511	5HK-S1	
C11	10000			BPD-01	DD-103	K082	ED-01	DC-511	5HK-S1	
C12	2.7									Note 1
C13	10000			BPD-01	DD-103	K082	ED-01	DC-511	5HK-S1	
C14	10000			BPD-01	DD-103	K082	ED-01	DC-511	5HK-S1	
C15	5000			BPD-005	DD-502	K080	ED-005	DC-525	5HK-D5	
C16	.05	200		BPD-05	DF-503	CUB2S5		PT415	2TM-S5	

Note 1. Not used in some versions.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	DEWALD PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	5000Ω	½	V310-1	AB-11		Q13-114	U12	Volume
B	Shaft			AK-4		Not Req.	Not Req.	Attach to R1A
C	Switch			KB-1		76-1	US-26	Attach to R1A

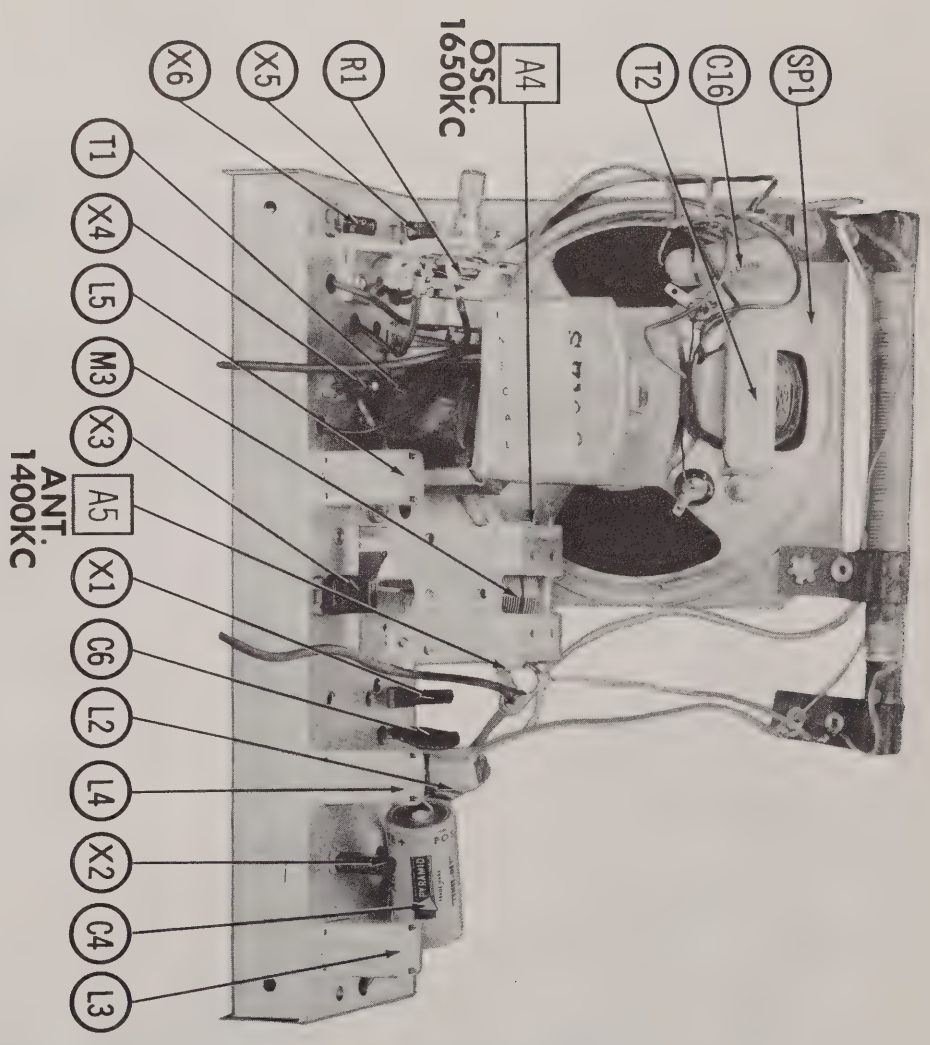
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	DEWALD PART No.	IRC PART No.	
R2	33K			BTS-33K	
R3	6800Ω			BTS-6800	Note 1
R4	2200Ω			BTS-2200	
R5	3900Ω			BTS-3900	
R6	4700Ω			BTS-4700	
R7	330Ω			BTS-330	
R8	47K			BTS-47K	
R9	12K			BTS-12K	Note 2
R10	2200Ω			BTS-2200	
R11	2200Ω			BTS-2200	
R12	100K			BTS-100K	
R13	4700Ω			BTS-4700	Note 3
R14	33K			BTS-33K	
R15	6800Ω			BTS-6800	
R16	1000Ω			BTS-1000	
R17	6800Ω			BTS-6800	Note 4
R18	82Ω			BTS-82	
R19	15K			BTS-15K	Note 4
R20	15K			BTS-15K	Note 4
R21	10Ω			BTS-10	

Note 1. Some versions use 18K in this application.
Note 2. Some versions use 33K in this application.
Note 3. Some versions use 2200Ω in this application.
Note 4. Not used in some versions.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (DRIVER)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: DEWALD PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	315Ω	184Ω CT					TR-6		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: DEWALD PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	820Ω	3-4Ω					TR-29		

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: DEWALD PART No.	QUAM PART No.	RCA TYPE No.	NOTES
SP1	4"	PM	3-4Ω	S-710-2	4A07	223S1	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: DEWALD PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Loop Stick	.8Ω	2Ω	L-130C				
L2	Osc. Coil	2Ω	5.7Ω *	O-133B-4			2022	* Tapped @1.1Ω
L3	1st. IF Trans.	10Ω ■	.8Ω	1-131-1	16-9012	BC-358	2041	■ Tapped @5.5Ω
L4	2nd. IF Trans.	10Ω ▲	.5Ω	1-131-1	16-9013	BC-359	2041	▲ Tapped @2.8Ω
L5	3rd. IF Trans.	10Ω ♦	.7Ω	1-131-2	16-9014	BC-359	2042	♦ Tapped @1.6Ω

BATTERIES

ITEM No.	VOLTAGE	DEWALD PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
M1	9V		276			D6			Connect 2 in parallel

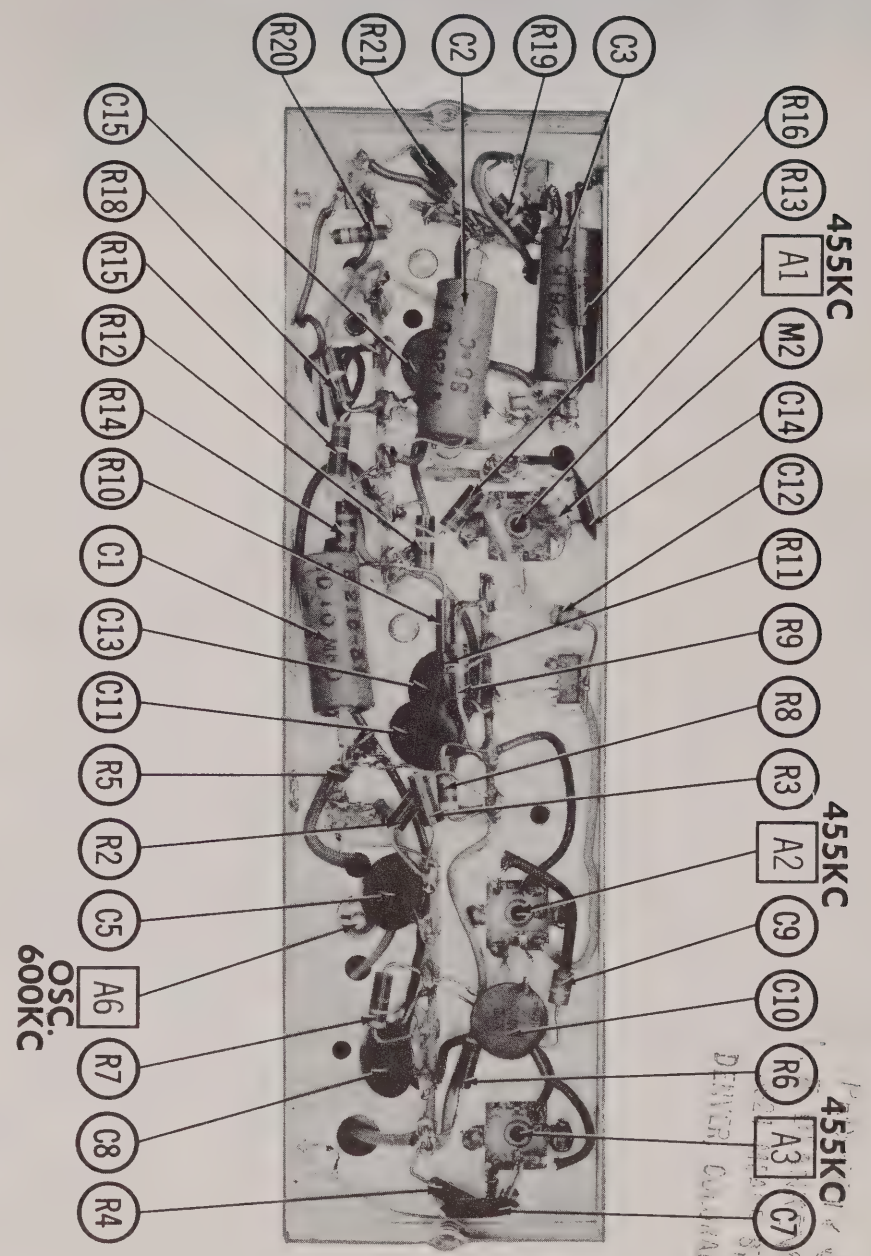
CRYSTAL DIODE

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: DEWALD PART No.	SYLVANIA PART No.	NOTES
M2	1N295	1N295	1N60	Audio Det. (Pigtail)

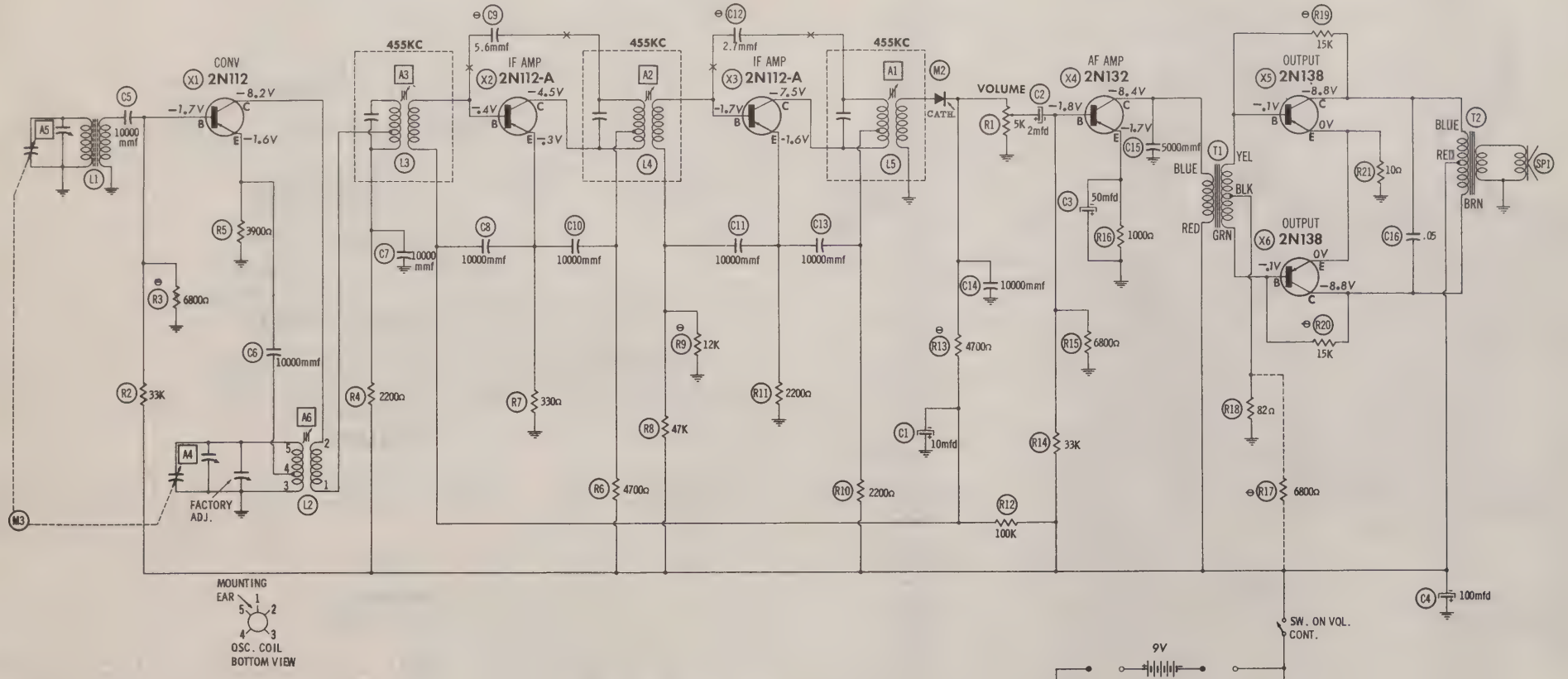
MISCELLANEOUS

ITEM No.	PART NAME	DEWALD PART No.	NOTES
M3	Tuning Cap.	V-214-1	2 Gang (16-220MMF, 22-120MMF)
	Cabinet	C-444	
	Knob	4229D-6	Tuning
	Knob	4228D-3	On-off-volume

CHASSIS—BOTTOM VIEW



DEWALD MODEL K-702B



ITEM	TUBE	Base	Emitter	Collector
V1	2NII2	2100Ω 5500Ω	3900Ω 1500Ω	†1800Ω †1400Ω
V2	2N112-A	1000Ω 8000Ω	 330Ω	†5000Ω †2400Ω
V3	2N112-A	2000Ω 10K	2000Ω 1200Ω	†2000Ω †1400Ω
V4	2NI32	1400Ω 5500Ω	1000Ω 650Ω	 †300Ω
V5	2N138	80Ω 170Ω	 10Ω	 †25Ω
V6	2N138	80Ω 170Ω	 10Ω	 †25Ω

† MEASURED FROM NEGATIVE SIDE OF C4.
DUAL READING INDICATES REVERSAL OF METER LEADS.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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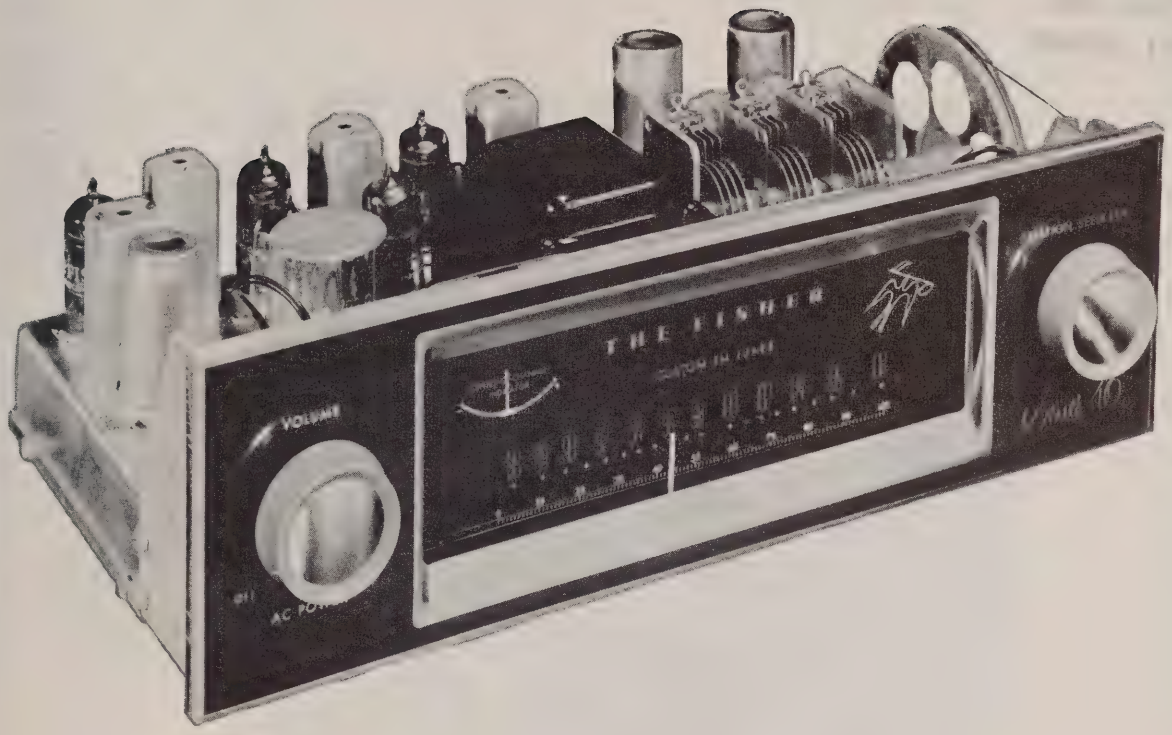
FISHER
MODEL FM-40



FISHER
MODEL FM-40

TRADE NAME	Fisher Model FM-40
MANUFACTURER	Fisher Radio Corp., 21-21 44th Drive, Long Island City 1, N.Y.
TYPE SET	AC Operated FM Tuner
TUBES	Eight
POWER SUPPLY	105-125 Volts AC - 50/60 Cycles RATING .37 Amp. @ 117 Volts AC
TUNING RANGE - FM	88MC - 108MC

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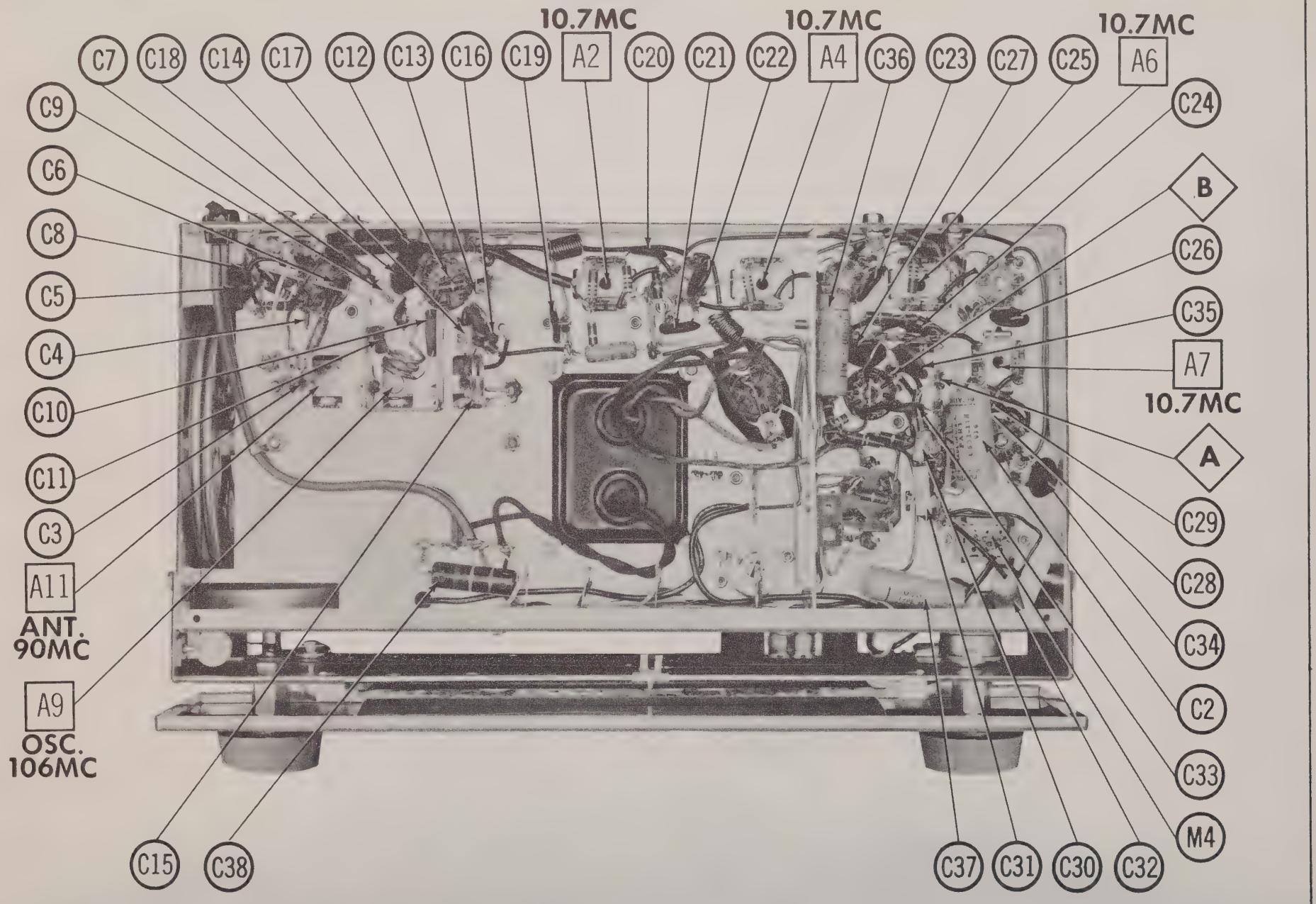
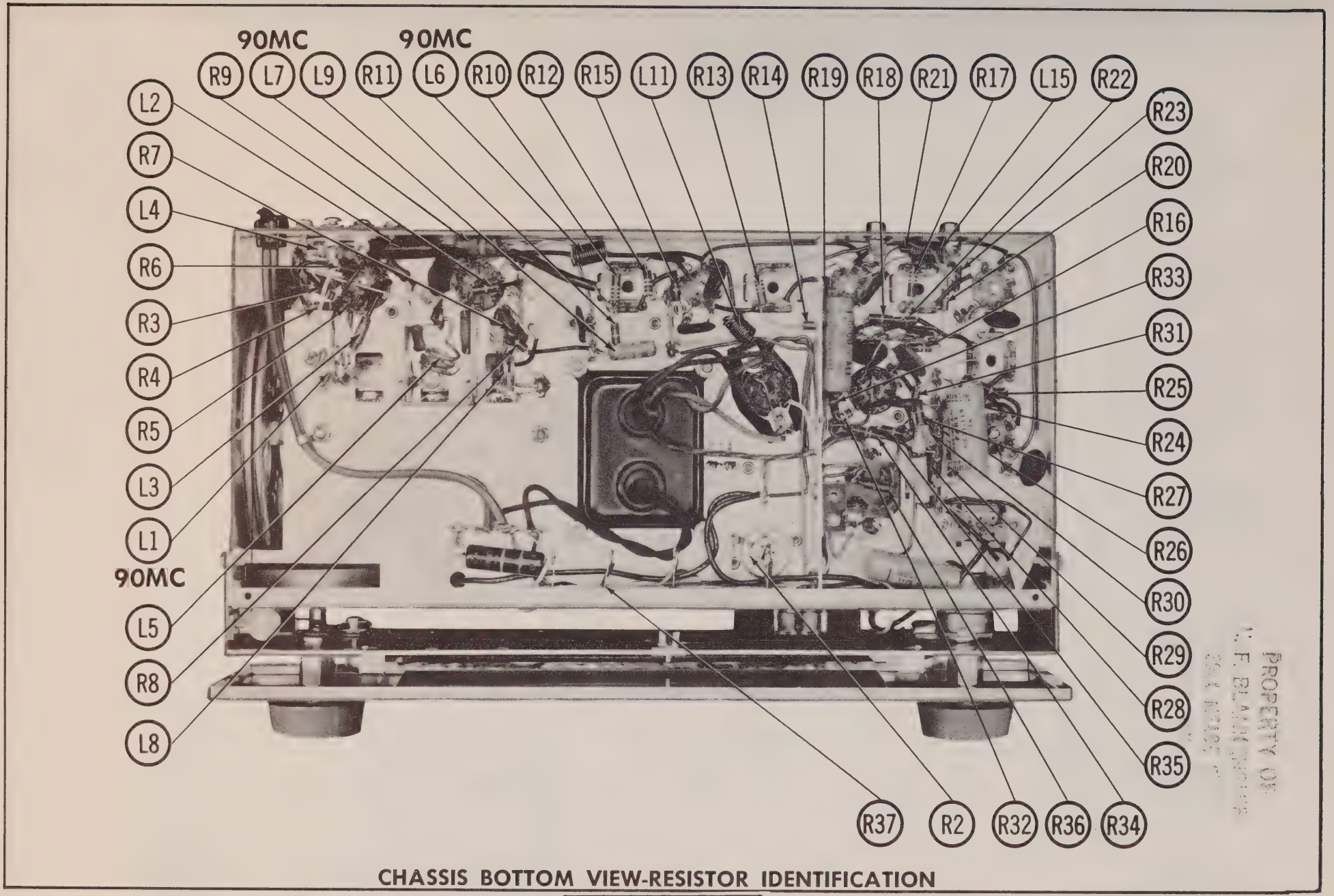
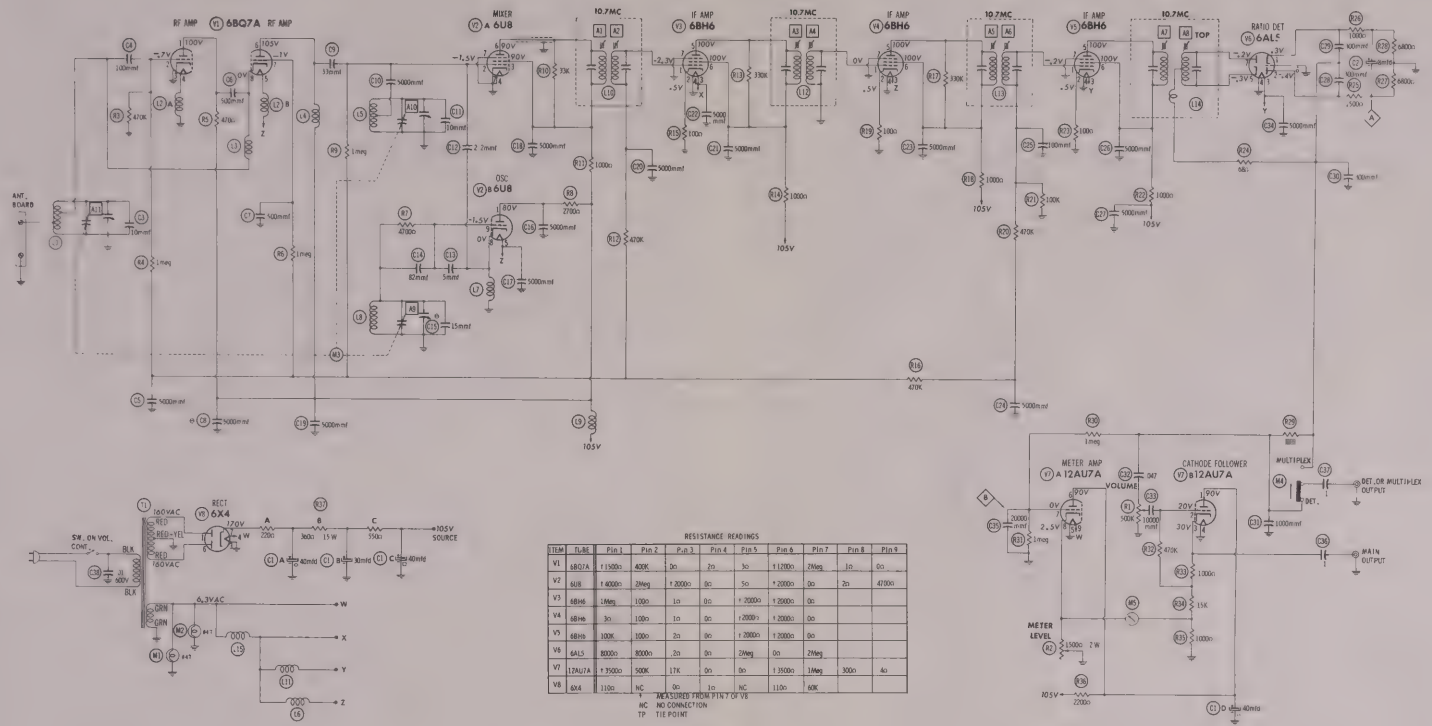


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BQ7A	† 1500Ω	400K	0Ω	2Ω	3Ω	† 12700Ω	2Meg	1Ω	0Ω
V2	6U8	† 40000Ω	2Meg	† 2000Ω	0Ω	5Ω	† 2000Ω	0Ω	2Ω	47000Ω
V3	6BH6	1Meg	100Ω	1Ω	0Ω	† 2000Ω	† 2000Ω	0Ω		
V4	6BH6	3Ω	100Ω	1Ω	0Ω	† 2000Ω	† 2000Ω	0Ω		
V5	6BH6	100K	100Ω	2Ω	0Ω	† 2000Ω	† 2000Ω	0Ω		
V6	6AL5	8000Ω	8000Ω	2Ω	0Ω	2Meg	0Ω	2Meg		
V7	12AU7A	† 3500Ω	500K	17K	0Ω	0Ω	† 3500Ω	1Meg	300Ω	4Ω
V8	6X4	110Ω	NC	0Ω	1Ω	NC	110Ω	60K		

† MEASURED FROM PIN 7 OF V6
NC NO CONNECTION
TP TIE POINT

⊘ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. All voltage readings are shown as bottom to ground.
3. Measured resistance readings are from bottom to ground, minimum negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Values could at maximum, no signal applied for voltage measurements

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343-5

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.		High side to ungrounded tube shield on 6U8 (V2). Low side to chassis.	10.7MC (unmod)	FM	Point of non-interference.	DC probe to point Ⓐ. Common to chassis.	A1, A2, A3, A4, A5, A6, A7	Adjust for maximum deflection.
2.		"	"	"	"	DC probe to point Ⓑ. Common to chassis.	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120Ω sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1.		High side to ungrounded tube shield on 6U8 (V2). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference.	Vert. amp. to point Ⓐ. Low side to chassis.	A1, A2, A3, A4, A5, A6, A7	Disconnect stabilizing capacitor C2. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
2.		"	"	"	"	Vert. amp. to point Ⓑ. Low side to chassis.	A8	Reconnect stabilizing capacitor C2. Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
3.	270Ω carbon resistor	High side thru dummy to antenna terminal. Low side to chassis.	106MC	FM	106MC	DC probe to point Ⓐ. Common to chassis.	A9	Adjust for maximum deflection.
4.	"	"	90MC	"	90MC	"	L7	Adjust for maximum deflection by expanding or compressing coil turns.
5.	"	"	"	"	"	"	A10, A11	Adjust for maximum deflection.
6.	"	"	"	"	"	"	L6, L1	Adjust for maximum deflection by expanding or compressing coil turns.

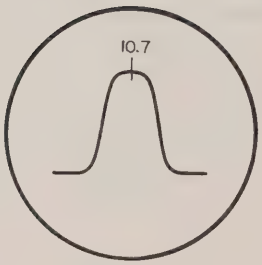


FIG. 1

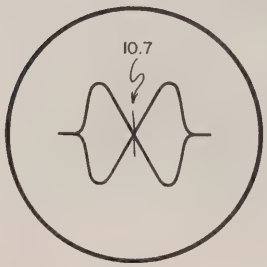
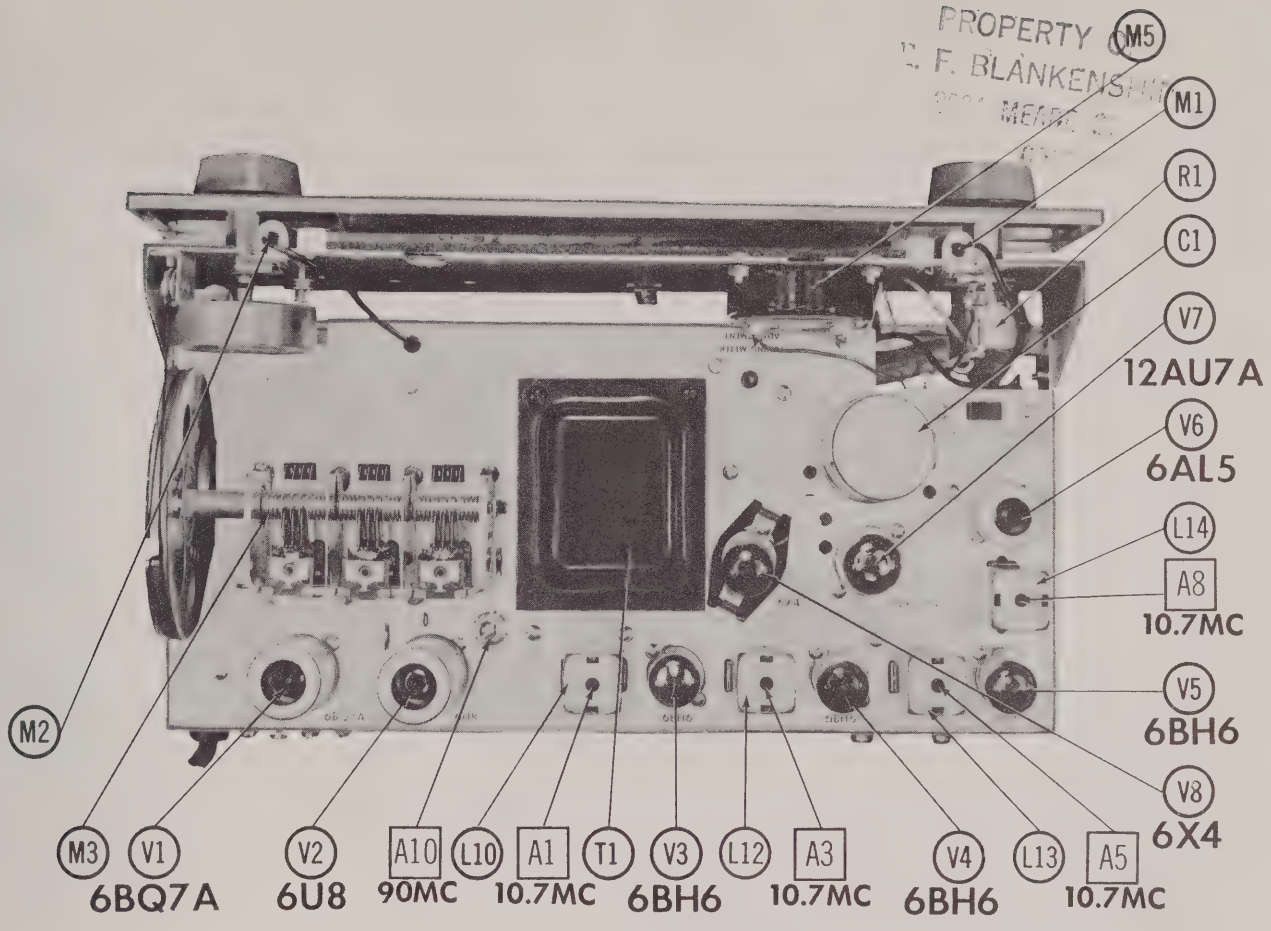
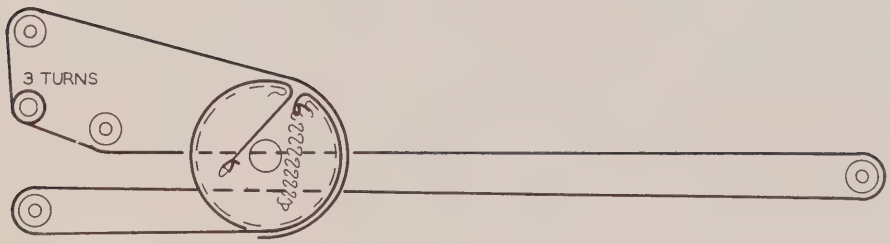


FIG. 2

PROPERTY
F. BLANKENSHIP

CHASSIS—TOP VIEW





TUNING GANG FULLY CLOSED

DIAL CORD STRINGING

PARTS LIST AND DESCRIPTIONS
TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	6BQ7A	
V2	Mixer-Oscillator	6U8	
V3	1st IF Amplifier	6BH6	
V4	2nd IF Amplifier	6BH6	
V5	3rd IF Amplifier	6BH6	
V6	Ratio Detector	6AL5	
V7	Meter Amplifier-Cathode Follower	12AU7A	
V8	Rectifier	6X4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	FISHER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	250						T-085	R2319*
B	30	200						MTD-4540	
C	■40	200							
D	▲40	200							
C2	8	50		PRS50V10	BR105	TC32	TD-10-50	FM-0510	TVA-1304

* Non catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	FISHER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C3	10		CC20CH100G5	NP0-S110	TCZ-10	TZ09	NP0A-100	ZT-541	5TCC-Q1	
C4	100		C-577-121	DI-0001	DD-101	G042	801-101	UC-531	5GA-T1	
C5	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC511	5HK-D5	
C6	500		C-1315	SI500	D6-501	TP47	GP2K-501	UC-535	5GA-T5	
C7	500		C-1315	SI500	D6-501	TP47	GP2K-501	UC-535	5GA-T5	
C8	5000		C-3338	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	Note 1
C9	33		CC21GP330M5	SI33	D6-330	TP27	GP1K-330	UC-5433	5GA-Q33	
C10	5000		C-3338	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C11	10		CC20CH100G5	NP0-S110	TCZ-10	TZ09	NP0A-100	ZT-541	5TCC-Q1	
C12	2.2		C-3039	NP0-SI2.2	TCZ-2R2	TZ05	NP0A-2R2		5TCCB-V22	
C13	5		CC20TJ050F5							
C14	82		CC21GP820K5	1469-000082	TCZ-82	TZ28	NP0-337-820			
C15	15									Note 2
C16	5000		C-3338							
C17	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C18	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C19	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C20	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C21	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C22	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C23	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C24	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C25	100		C-577-121	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C26	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C27	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C28	300		CC21GP301K5	1469-0003	D6-331	5R5T3	811-301	MCB241	MS-33	
C29	300		CC21GP301K5	1469-0003	D6-331	5R5T3	811-301	MCB241	MS-33	
C30	300		CC21GP301K5	1469-0003	D6-331	5R5T3	811-301	MCB241	MS-33	
C31	1000			1464-001		1R5D1	811-102	MCB255	MS-21	Note 3
C32	.047	200	C68P473M2	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C33	10000		CK62GP103V6	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C34	5000		CK62GP502V6	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C35	20000		C-556-122	BPD-02	DD-203	K085	817-02		5HK-S2	
C36	.1	200	C68P104M2	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C37	.1	200	C68P104M2	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C38	.01	600	C-2747	BPD-01	D6-103	CUB6S1	GP3-333-103	PT611	6TM-S1	

Note 1: Not used in some versions.
Note 2: Some versions may use 11MMF in this application. (Part #CC20LK110K5).
Note 3: Some versions may use 1300MMF in this application. (Part #CC26GP132K5).

PARTS LIST AND DESCRIPTIONS (Continued)
CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA FISHER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	R-50000-17				U48	Volume
B	Switch		Not Req.				US-26	Attach to R1A
R2	1500Ω	2	R-520-149		39-1500		FL-1.5K	Tuning Meter Level (Wire wound)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	FISHER PART No.	IRC PART No.	NOTES
R3	470K		RC20BF474K	BTS-470K	
R4	1Meg		RC20BF105K	BTS-1Meg	
R5	470Ω		RC20BF471K	BTS-470	
R6	1Meg		RC20BF105K	BTS-1Meg	
R7	4700Ω		RC20BF472K	BTS-4700	
R8	2700Ω		RC20BF272K	BTS-2700	
R9	1Meg		RC20BF105K	BTS-1Meg	
R10	33K		RC20BF333K	BTS-33K	
R11	1000Ω		RC20BF102K	BTS-1000	
R12	470K		RC20BF474K	BTS-470K	
R13	330K		RC20BF334K	BTS-330K	
R14	1000Ω		RC20BF102K	BTS-1000	
R15	100Ω		RC20BF101K	BTS-100	
R16	470K		RC20BF474K	BTS-470K	
R17	330K		RC20BF334K	BTS-330K	
R18	1000Ω		RC20BF102K	BTS-1000	
R19	100Ω		RC20BF101K	BTS-100	
R20	470K		RC20BF474K	BTS-470K	
R21	100K		RC20BF104K	BTS-100K	
R22	1000Ω		RC20BF102K	BTS-1000	
R23	100Ω		RC20BF101K	BTS-100	
R24	68Ω		RC20BF680K	BTS-68	
R25	1500Ω		RC20BF152K	BTS-1500	
R26	1000Ω		RC20BF102K	BTS-1000	
R27	6800Ω		RC20BF682K	BTS-6800	
R28	6800Ω		RC20BF682K	BTS-6800	
R29	68K		RC20BF683K	BTS-68K	
R30	1Meg		RC20BF105K	BTS-1Meg	
R31	1Meg		RC20BF105K	BTS-1Meg	
R32	470K		RC20BF474K	BTS-470K	
R33	1000Ω		RC20BF102K	BTS-1000	
R34	15K		RC20BF153K	BTS-15K	
R35	1000Ω		RC20BF102K	BTS-1000	
R36	2200Ω		RC20BF222K	BTS-2200	
R37A	220Ω	15	R-550-134		
B	360Ω				
C	550Ω				

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	FISHER PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.37A	380VCT @.062ADC	6.3VAC @2.85A		T-557-111					

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	FISHER PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Coil	0Ω		L-577-126				Tapped
L2A	Fil. Choke	0Ω						
B	Fil. Choke	0Ω						
L3	RF Choke	.1Ω		L-520-178	19-1002		4606	2 Microhenries
L4	RF Choke	1.8Ω		L-3352	19-1002		4606	2.2 Microhenries
L5	FM RF Coil	0Ω		L-577-127				Tapped
L6	Fil. Choke	0Ω		L-520-156	19-1000		4602	1.2 Microhenries
L7	Cathode Choke	1.8Ω		L-3352	19-1002		4606	2.2 Microhenries
L8	Osc. Coil	0Ω		L-577-128				
L9	RF Choke	1.8Ω		L-3352	19-1002		4606	2.2 Microhenries
L10	1st FM IF	.7Ω	.7Ω	ZZ-2987	16-3487	FM-254	1463	
L11	Fil. Choke	0Ω		L-520-156	19-1000		4602	1.2 Microhenries
L12	2nd FM IF	1.6Ω	.5Ω	ZZ-509-130				
L13	3rd FM IF	1.6Ω	.5Ω	ZZ-509-130				
L14	Ratio Det.	1.5Ω	.9ΩCT	ZZ-2986	17-3498	FM-255	1465	Tertiary winding = .4Ω
L15	Fil. Choke	0Ω		L-520-156	19-1000		4602	1.2 Microhenries

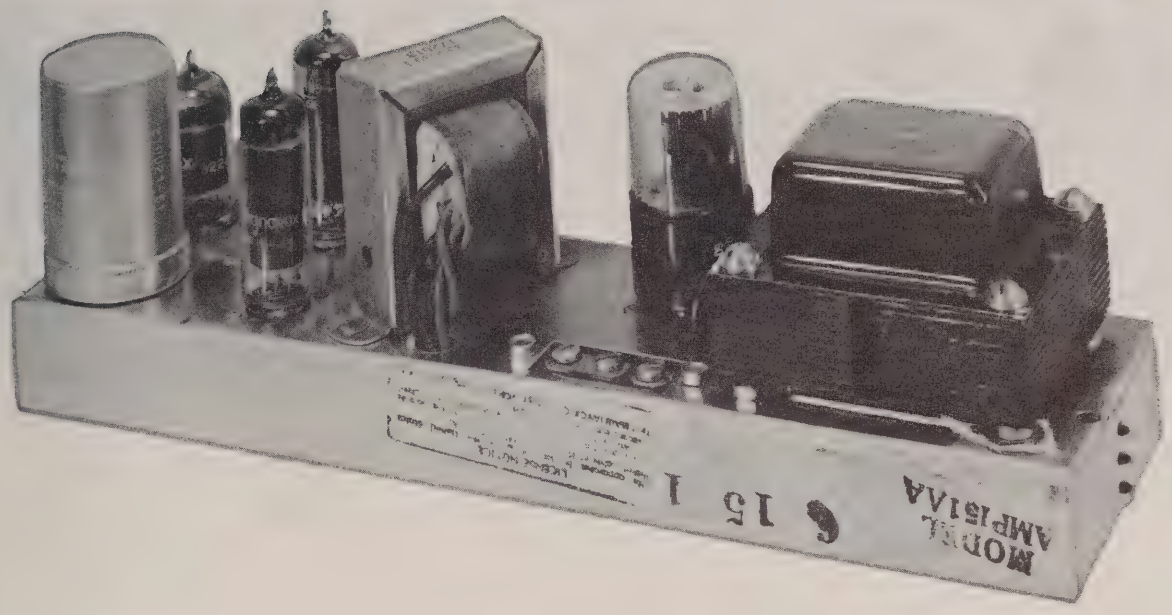
MISCELLANEOUS

ITEM No.	PART NAME	FISHER PART No.	NOTES
M1	Pilot Light	I-50009-1	#47
M2	Pilot Light	I-50009-1	#47
M3	Tuning Cap.	C577-112	3 Gang
M4	Switch	S-577-114	Detector - Multiplex (SPDT-Slide Type)
M5	Meter	M-550-132-2	Tuning Indicator

MAGNAVOX CHASSIS AMP-151AA

PROPERTY OF
[illegible]
3301 MEADE ST.
DENVER, COLORADO

MAGNAVOX CHASSIS
AMP-151AA



MAGNAVOX CHASSIS
AMP-151AA

TRADE NAME	Magnavox Chassis AMP-151AA
MANUFACTURER	Magnavox Co., 2131 Bueter Rd., Fort Wayne, Ind.
TYPE SET	AC Operated 6 Watt Audio Amplifier
TUBES (Four)	Types 12AX7 AF Amp.-Phase Inv., (2) 6AQ5 Output, 6X5GT Rectifier
POWER SUPPLY	110-120 Volts AC - 50/60 Cycles RATING .37 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

MAGNAVOX
CHASSIS AMP-151AA

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	AF Amp. -Phase Inverter	12AX7	
V2	Output	6AQ5	
V3	Output	6AQ5	
V4	Rectifier	6X5GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	MAGNAVOX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	◓40	300	270021-61	AFH4-01-80	D0440	FP419. 86	TMQ-56	Q-210	TVL-4621
B	■20	300							
C	▲10	300							
D	10	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	MAGNAVOX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.1	200	250202-13	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C3	10000		250218-19	BPD-01	DD-103	K082	ED-01	DC511	5HK-S1	
C4	10000		250218-19	BPD-01	DD-103	K082	ED-01	DC511	5HK-S1	
C5	.047	200	250202-11	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C6	1.0	100	250172-9	P288N-1.0		CUB2W1		PT41	2TM-M1	
C7	10000	1000	250219-2	P1088N-01	DD-103	CUB16S1		PT1611	10HK-S1	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MAGNAVOX PART No.	IRC PART No.	
R1	470Ω		230104-58	BTS-470	
R2	10K		230104-74	BTS-10K	
R3	150K		230104-88	BTS-150K	
R4	470K		230104-94	BTS-470K	
R5	6800Ω		230104-72	BTS-6800	
R6	22K		230104-78	BTS-22K	

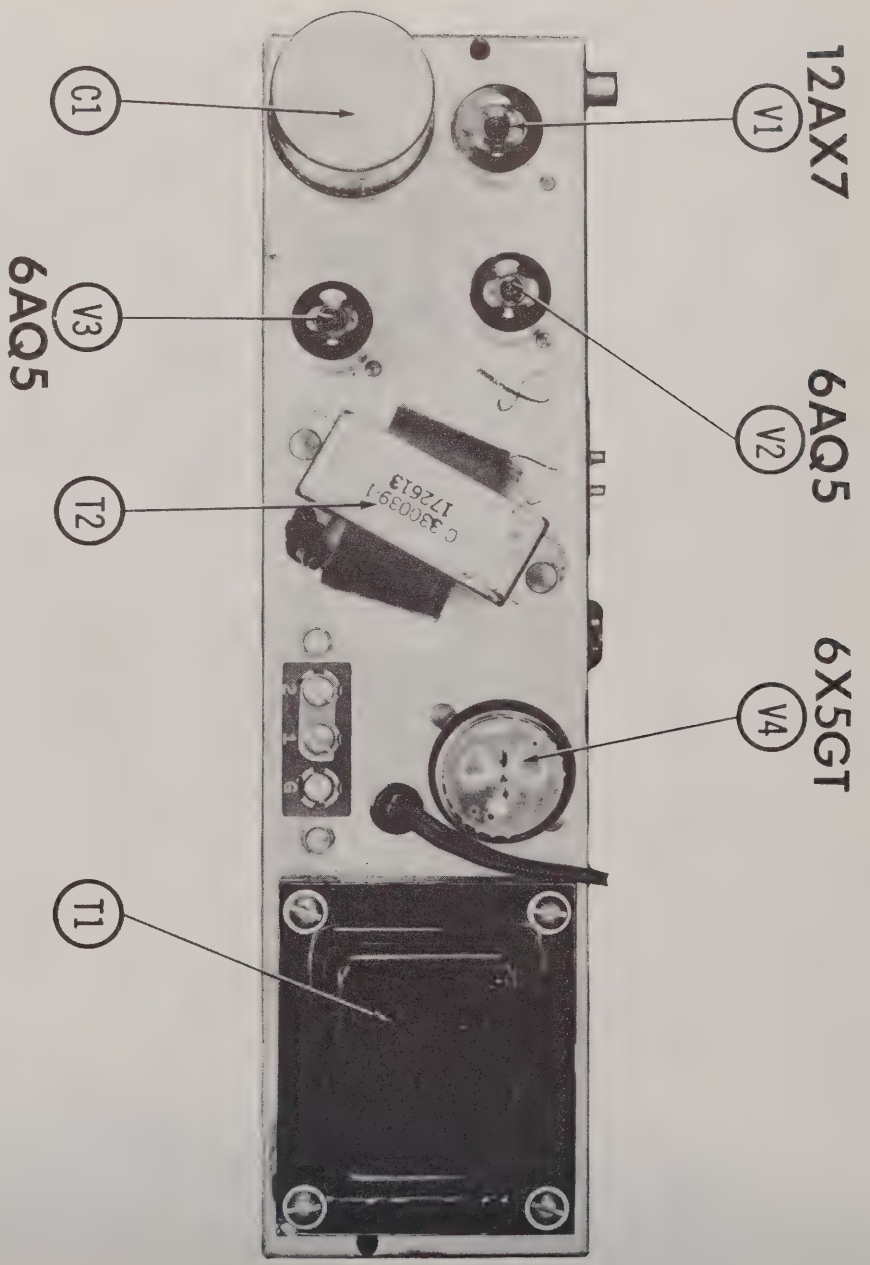
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MAGNAVOX PART No.	IRC PART No.	
R7	470K		230104-94	BTS-470K	
R8	470K		230104-94	BTS-470K	
R9	470K		230104-94	BTS-470K	
R10	220Ω	2	230096-54	BTB-220	
R11	1500Ω		230104-64	BTS-1500	
R12	22K		230104-78	BTS-22K	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ⓐ.37A	475VCT ⓐ.064A	6.3VAC ⓐ1.8A		300088-1	P9205 ①	P-3048	PM-8419		R-8B ①

① Tape 5V, 2A winding .

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7200Ω	3-4Ω	330039-1	Z1009	A-2901	A-3852	24S61	S-53X	

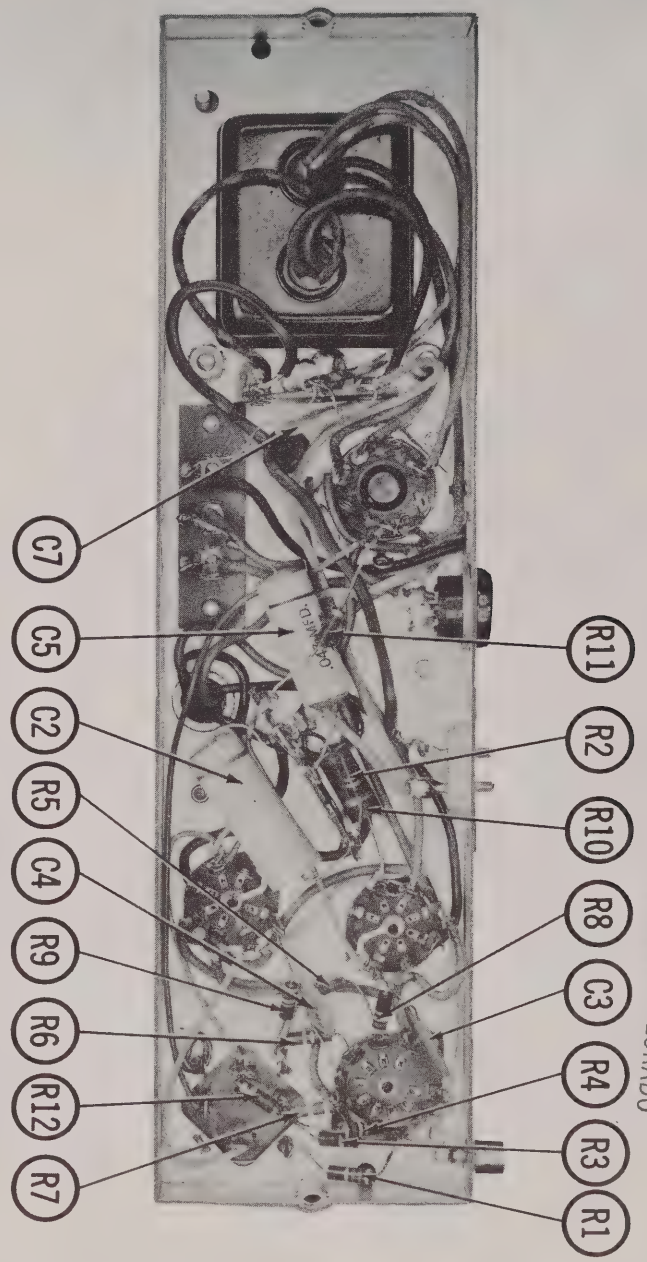
SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	MAGNAVOX PART No.	QUAM PART No.	RCA TYPE No.	
SP1			6Ω	583760-1			
SP2			6Ω	583760-1			
SP3	5"	PM	3.2Ω	580038-1	5A15TZ3.2		

MISCELLANEOUS

ITEM No.	PART NAME	MAGNAVOX PART No.	NOTES
M1	Pilot Light		

CHASSIS—BOTTOM VIEW



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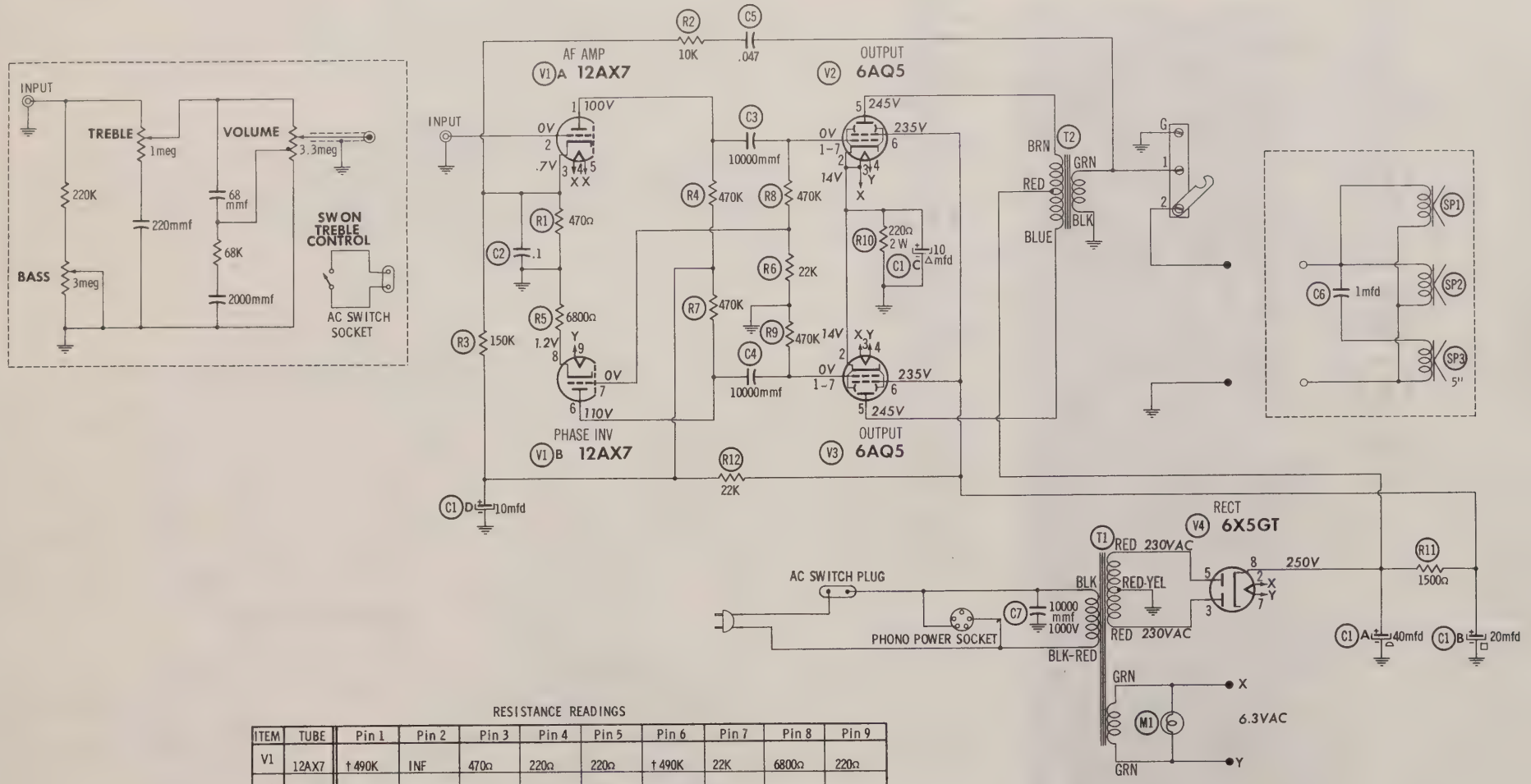
DENVER, COLORADO

MAGNAVOX
CHASSIS AMP-151AA

MAGNAVOX
CHASSIS AMP-151AA



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†490K	INF	470Ω	220Ω	220Ω	†490K	22K	6800Ω	220Ω
V2	6AQ5	490K	220Ω	220Ω	220Ω	†140Ω	†1500Ω	490K		
V3	6AQ5	470K	220Ω	220Ω	220Ω	†130Ω	†1500Ω	470K		
V4	6X5GT	NC	220Ω	165Ω	NC	150Ω	NC	220Ω	18K	

† MEASURED FROM PIN 8 OF V4.
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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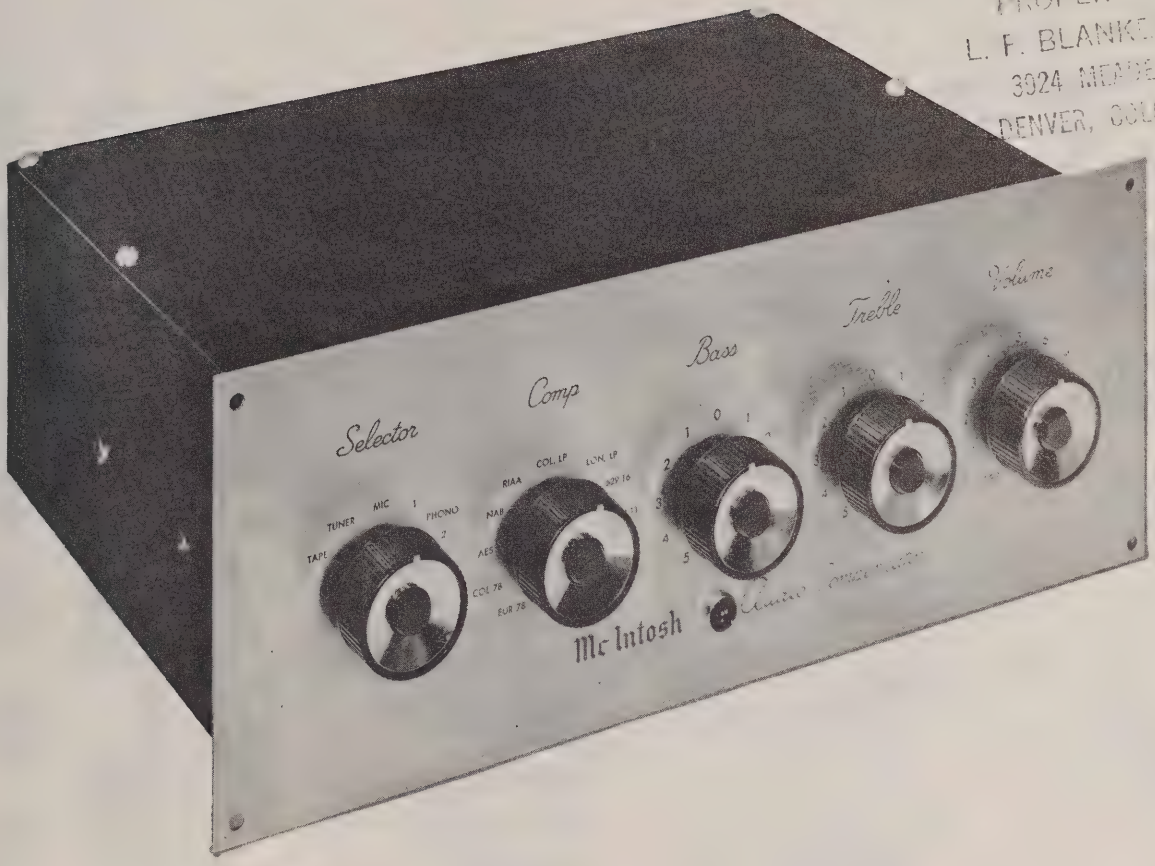
MC INTOSH
MODELS C-4, C-4P



MC INTOSH
MODELS C-4, C-4P

TRADE NAME	McIntosh Models C-4, C-4P
MANUFACTURER	McIntosh Laboratory, Inc., 320 Water St., Binghamton, N.Y.
TYPE SET	5 Channel Audio Preamplifier and Compensator
TUBES (Three)	Types 12AX7 Preamplifier, 12AX7 Cathode Follower, 12AX7 AF Amp.-Cathode Follower
POWER SUPPLY	300-400 Volts DC B+, 6.3 Volts Filament

MODEL C-4P INCLUDES MODEL D-8 POWER SUPPLY UNIT. FOR SERVICE INFORMATION ON THE POWER SUPPLY UNIT, SEE PHOTOFACT SET 314-FOLDER 8.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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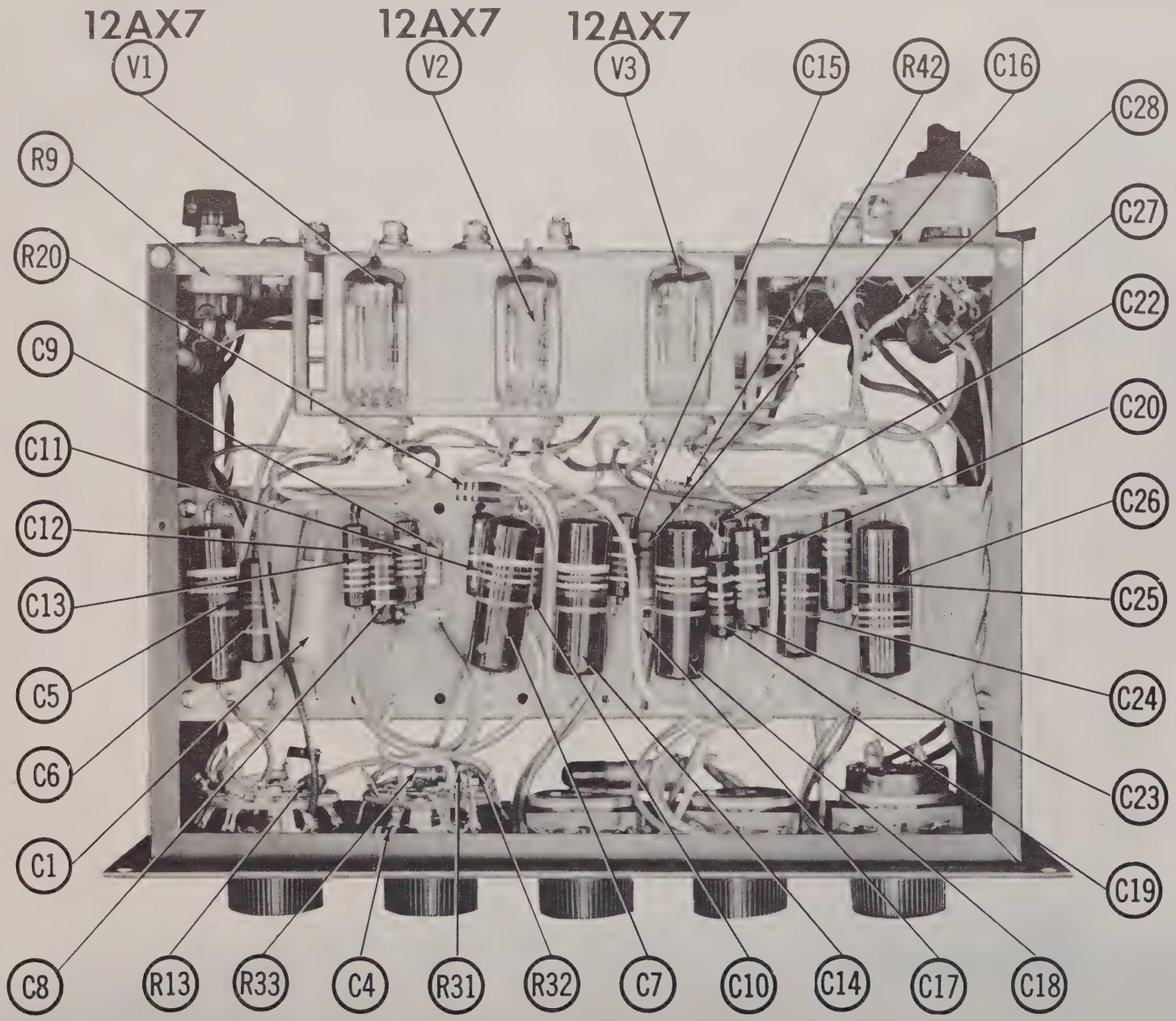


CHASSIS-TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Preamplifier	12AX7	
V2	AF Amplifier	12AX7	
V3	AF Amplifier–Cathode Follower	12AX7	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA: MC INTOSH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	50	6		SRE6V50	BBR50-6	TC29	TD-50-6	MMT-650	TVA-1100
C2A	▲30	250						T-625	R2317 *
B	■30	300						MTD-4510	
C	▬20	450							

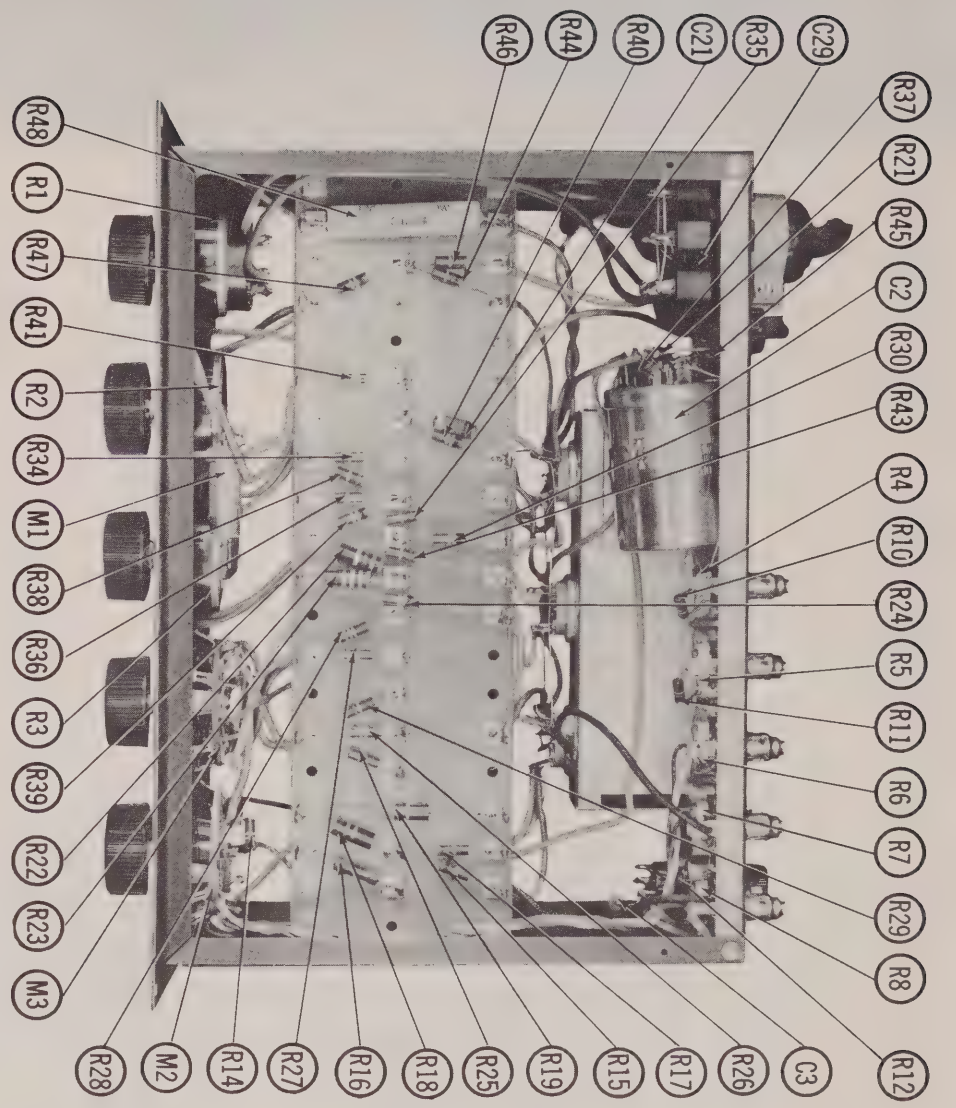
* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: MC INTOSH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C3	100			NP0-SI100	D6-101	TZ30	ED-100	MCB235	MS-31	
C4	.001	400		1464-001		1R5D1	ED-1000	MCB255	MS-21	
C5	.47	200		P288N-47		CUB2P47		PT4047	2TM-P47	
C6	.033	400		BPD-03	DF-303	CUB6S33		PT6133	6TM-S33	
C7	.47	200		P288N-47		CUB2P47		PT4047	2TM-P47	
C8	.0022	400		1464-0022		1R5D22			MS-222	
C9	470			1464-00047		1R5T47			MS-347	
C10	.001	400		1464-001		1R5D1	ED-1000	MCB255	MS-21	
C11	.001	400		1464-001		1R5D1	ED-1000	MCB255	MS-21	
C12	.0018	400		1464-0018		1R5D18	ED-1800		MS-218	
C13	.0033	400		1464-0033		1R5D33			MS-233	
C14	.47	200		P288N-47		CUB2P47		PT4047	2TM-P47	
C15	.0047	400		BPD-0047	D6-472	CUB6D47	ED-.0047	PT6247	4TM-D47	
C16	1500			1464-0015		1R5D15	ED-1500		MS-215	
C17	1500			1464-0015		1R5D15	ED-1500		MS-215	
C18	.47	200		P288N-47		CUB2P47		PT4047	2TM-P47	
C19	.001	400		1464-001		1R5D1	ED-1000	MCB255	MS-21	
C20	.01	400								
C21	47			NP0-SI47	D6-470	TZ22	ED-47	ZT-5447	5TCC-Q47	
C22	.0022	400		1464-0022		1R5D22			MS-222	
C23	.022	400								
C24	.1	400		P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C25	.033	400		BPD-03	DF-303	CUB6S33		PT6133	6TM-S33	
C26	.47	200		P288N-47		CUB2P47		PT4047	2TM-P47	
C27A	10000		BPD-2X01	DD3-103	DK082	ED-.01		DC-511	5HK-2S1	
B	10000					ED-.01		DC-511		
C28A	10000		BPD-2X01	DD3-103	DK082	ED-.01		DC-511	5HK-2S1	
B	10000					ED-.01		DC-511		
C29	4700		BPD-0047	DD-472	K079	ED-.0047		UC-5247	5HK-D47	

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA						INSTALLATION NOTES
	RESISTANCE	WATTS	MC INTOSH PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.		
R1A	1Meg	½		AB-70	A47-1Meg-Z	Q13-137	U53		Volume
B	Shaft			AK-4	KSS-3	Not Req.	Not Req.		Attach to R1A
C	Switch			KB-2	SWE-20	76-2	US-27		Attach to R1A
R2A	250K	½		AB-51	AK47-250K-Z	Q13-130	U44		Treble
B	Shaft			AK-4	KSS-3	Not Req.	Not Req.		Attach to R2A
R3A	1Meg	½		AB-70	A47-1Meg-Z	Q13-137	U53		Bass
B	Shaft			AK-4	KSS-3	Not Req.	Not Req.		Attach to R3A
R4A	100K	½		AB-41	A47-100K-Z	Q13-128	U39		Level, tape
B	Shaft			AK-1	FKS-1/4	RQ	Not Req.		Attach to R4A
R5A	100K	½		AB-41	A47-100K-Z	Q13-128	U39		Level, tuner
B	Shaft			AK-1	FKS-1/4	RQ	Not Req.		Attach to R5A
R6A	100K	½		AB-41	A47-100K-Z	Q13-128	U39		Level, Mic input
B	Shaft			AK-1	FKS-1/4	RQ	Not Req.		Attach to R6A
R7A	100K	½		AB-41	A47-100K-Z	Q13-128	U39		Level, Phono #1 input
B	Shaft			AK-1	FKS-1/4	RQ	Not Req.		Attach to R7A
R8A	100K	½		AB-41	A47-100K-Z	Q13-128	U39		Level, Phono #2 input
B	Shaft			AK-1	FKS-1/4	RQ	Not Req.		Attach to R8A
R9A	100K	½		AB-40	A47-100 K-S	Q11-128	U41		Load, Phono #2
B	Shaft			AK-9	RS-2	PQ	Not Req.		Attach to R9A
C	Switch			KB-2	SWE-20	76-2	US-27		Attach to R9A

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

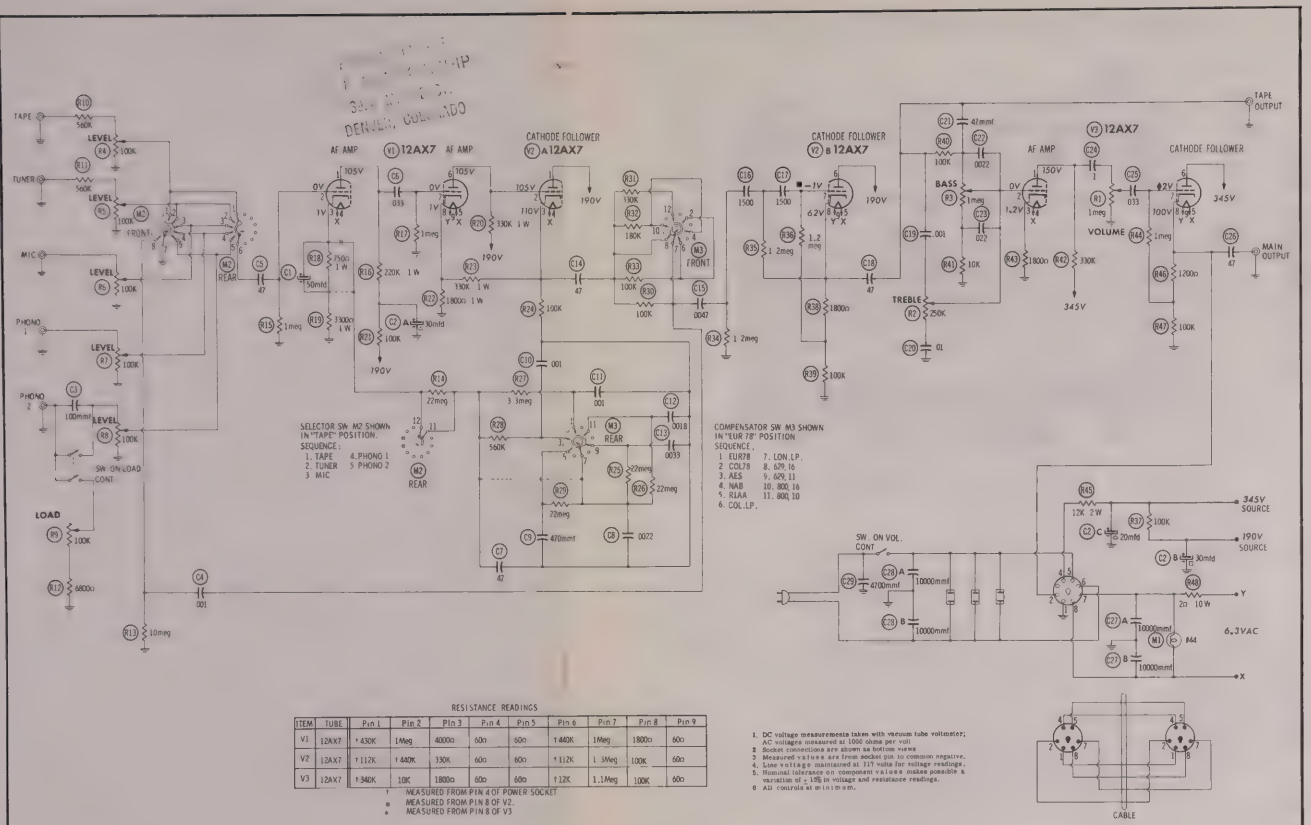
All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MC INTOSH PART No.	IRC PART No.	
R10	560K			BTS-560K	
R11	560K			BTS-560K	
R12	6800Ω			BTS-6800	
R13	10Meg			BTS-10Meg	
R14	22Meg			BTS-22Meg	
R15	1Meg			BTS-1Meg	
R16	220K	1		BTA-220K	
R17	1Meg			BTS-1Meg	
R18	750Ω 5%	1		BTA-750Ω 5%	
R19	3300Ω	1		BTA-3300	
R20	330K	1		BTA-330K	
R21	100K			BTS-100K	
R22	1800Ω	1		BTA-1800	
R23	330K	1		BTA-330K	
R24	100K			BTS-100K	
R25	22Meg			BTS-22Meg	
R26	22Meg			BTS-22Meg	
R27	3.3Meg			BTS-3.3Meg	
R28	560K			BTS-560K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MC INTOSH PART No.	IRC PART No.	
R29	22Meg			BTS-22Meg	
R30	100K			BTS-100K	
R31	330K			BTS-330K	
R32	180K			BTS-180K	
R33	100K			BTS-100K	
R34	1.2Meg			BTS-1.2Meg	
R35	1.2Meg			BTS-1.2Meg	
R36	1.2Meg			BTS-1.2Meg	
R37	100K			BTS-100K	
R38	1800Ω			BTS-1800	
R39	100K			BTS-100K	
R40	100K			BTS-100K	
R41	10K			BTS-10K	
R42	330K			BTS-330K	
R43	1800Ω			BTS-1800	
R44	1Meg			BTS-1Meg	
R45	12K	2		BTB-12K	
R46	1200Ω			BTS-1200	
R47	100K			BTS-100K	
R48	2Ω	10		PW10-2	

MISCELLANEOUS

ITEM No.	PART NAME	MC INTOSH PART No.	NOTES
M1	Pilot Light		#44
M2	Switch		Selector (Rotary, wafer type)
M3	Switch		Compensation (Rotary, wafer type)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†430K	1Meg	4000Ω	60Ω	60Ω	†440K	1Meg	1800Ω	60Ω
V2	12AX7	†112K	†440K	330K	60Ω	60Ω	†112K	1.3Meg	100K	60Ω
V3	12AX7	†340K	10K	1800Ω	60Ω	60Ω	†12K	1.1Meg	100K	60Ω

† MEASURED FROM PIN 4 OF POWER SOCKET
■ MEASURED FROM PIN 8 OF V2.
● MEASURED FROM PIN 8 OF V3

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum.

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MOTOROLA MODEL 21T33CH

TRADE NAME	Motorola	MODELS	CHASSIS
		21K54B, 21K54M, 21T33BG, 21T33CH, 21T33MG, 21T35B, 21T35M	TS-538
		Y21K54B, Y21K54M, Y21T33BG, Y21T33CH, Y21T33MG, Y21T35B, Y21T35M	TS-538Y
		21K59M, 21K59MCH, 24K14B, 24K14M, 24T6B, 24T6M	VTS-538
		Y21K59M, Y21K59MCH, Y24K14B, Y24K14M, Y24T6B, Y24T6M	VTS-538Y
		21K56B, 21K56M, 21K57B, 21K57M, 21K57MCH, 21K58B, 21K58M, 21T36B, 21T36M	WTS-538
		Y21K56B, Y21K56M, Y21K57B, Y21K57M, Y21K57MCH, Y21K58B, Y21K58M, Y21T36B, Y21T36M	WTS-538Y

MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Television Receiver
TUBES	Twenty
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING 1.84 Amp. @117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 1
Horizontal Sweep Circuit Adjustments 16
Parts List and Descriptions 12, 13, 14
Photographs
- Cabinet-Rear View 16
- Capacitor & Alignment Identification 3, 10
- Chassis-Top View 15
- RF Tuner 15, 16

Photographs (Cont)
- Resistor & Inductor Identification 4, 9

Resistance Measurements 8
Servicing in the Field 1
Schematic (Alternate Tuner) 11
Schematic (TV) 2
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

MOTOROLA MODELS Y21K54B, M, Y21K56B, M, Y21K57B, M, MCH, Y21K58B, M, Y21K59M, MCH, Y21T33BG, CH, MG, Y21T35B, M, Y21T36B, M, Y24K14B, M, Y24T6B, M, 21K54B, M, 21K56B, M, 21K57B, M, MCH, 21K58B, M, 21K59M, MCH, 21T33BG, CH, MG, 21T35B, M, 21T36B, M, 24K14B, M, 24T6B, M (Ch. TS-538, Y, VTS-538, Y, WTS-538, Y) Tel. Rec.

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DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

1. Remove 1 metal screw from rear cover. Unsnap rear cover to remove.

2. Disconnect speaker leads.

3. Remove 2 metal screws holding fiber bracket.

4. Remove safety glass as outlined under "Safety Glass Removal".

5. Remove 2 metal screws holding top front of cabinet.

6. Remove 6 metal screws holding cabinet to chassis pan.

7. Remove cabinet from chassis.

8. Remove 4 speaker nuts. Remove speaker.

MODEL	CHASSIS
21T33CH	TS-538

MOTOROLA MODELS Y21K54B, M, Y21K56B, M, Y21K57B, M, MCH, Y21K58B, M, Y21K59M, MCH, Y21T33BG, CH, MG, Y21T35B, M, Y21T36B, M, Y24K14B, M, Y24T6B, M, 21K54B, M, 21K56B, M, 21K57B, M, MCH, 21K58B, M, 21K59M, MCH, 21T33BG, CH, MG, 21T35B, M, 21T36B, M, 24K14B, M, 24T6B, M (Ch. TS-538, Y, VTS-538, Y, WTS-538, Y) Tel. Rec.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

PICTURE TUBE SAFETY GLASS CLEANING

Unsnap name plate at top of safety glass. Remove 2 metal screws from safety glass retainer bracket. Use extreme caution when removing safety glass.

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

To adjust the horizontal oscillator, remove the rear cover and supply power to the chassis. The horizontal oscillator slug (B1) is accessible thru a hole in the rear panel of the chassis. Set the horizontal hold control at mid-range position and adjust the horizontal oscillator slug (B1) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (A13) located on top of the chassis.

FUSES

Two fuses are used. One for horizontal sweep circuit protection and one for filament protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

FOCUS

Focus is varied by placement of jumper strap between pins 6 and 10 or 6 and 1 on base of picture tube.

ANTI-PIN CUSHION ADJUSTMENT

Reduce the picture size so that the sides of the raster are visible, and position the magnets so that all sides are straight lines and the corners are at right angles.

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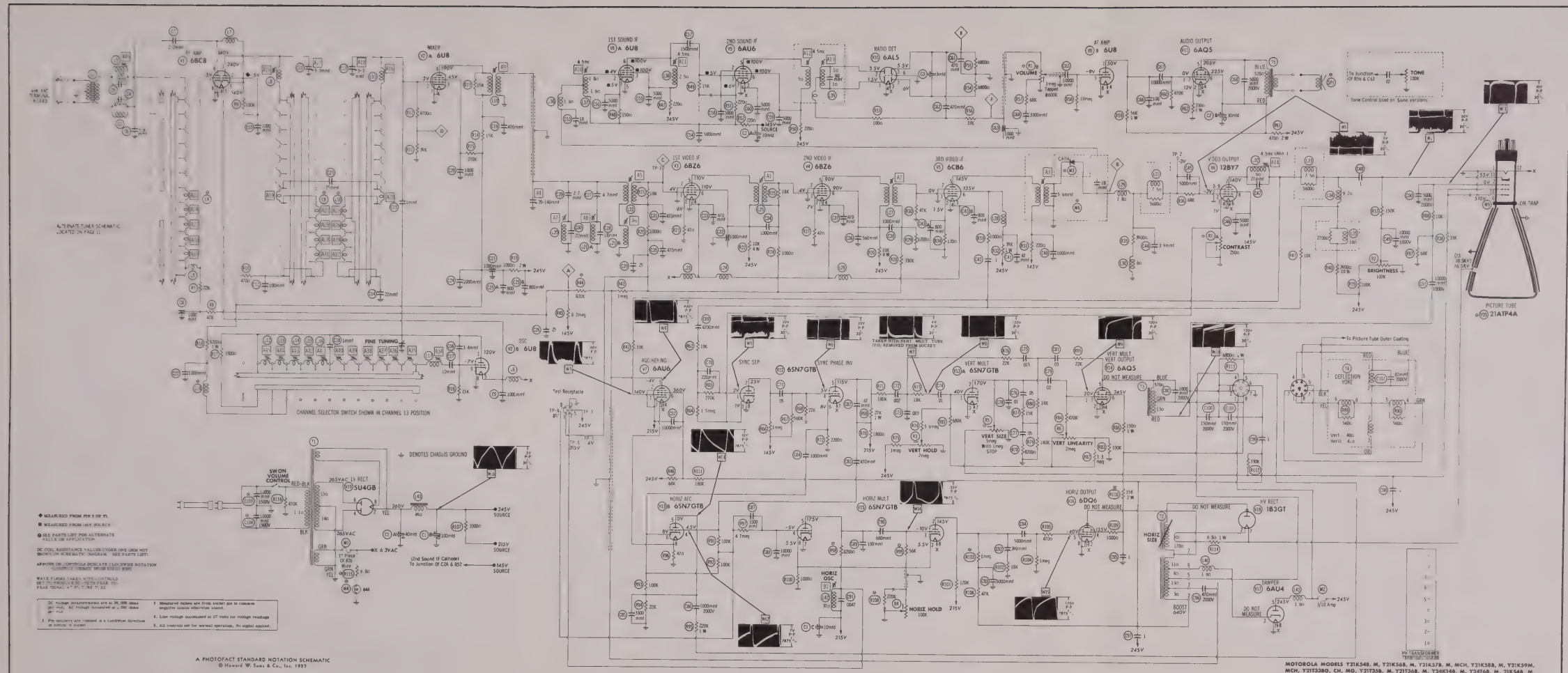
MOTOROLA MODELS Y21K54B, M, Y21K56B, M, Y21K57B, M, MCH, Y21K58B, M, Y21K59M, MCH, Y21T33BG, CH, MG, Y21T33B, M, Y21T36B, M, Y24K14B, M, Y24T6B, M, 21K54B, M, 21K56B, M, 21K57B, M, MCH, 21K58B, M, 21K59M, MCH, 21T33BG, CH, MG, 21T33B, M, 21T36B, M, 24K14B, M, 24T6B, M (Ch. TS-538, Y, VTS-538, Y, WTS-538, Y) Tel. Rec.
1ST AMP V1 6BC8
MIXER V2A 6U8
1ST SOUND IF V1B 6U8
2ND SOUND IF V5 6AU6
RATIO DET V7B 6AL5
AF AMP V8B 6U8
AUDIO OUTPUT V11 6AQ5
1ST VIDEO IF V1 6BZ6
2ND VIDEO IF V4 6BZ6
3RD VIDEO IF V5 6CB6
VIDEO OUTPUT V6 12BY7
OSC V7B 6U8
AGC KEYING V7 6AU6
SYNC SEP V12A 6SN7GTB
SYNC PHASE INV V12B 6SN7GTB
VERT MULT V13A 6SN7GTB
VERT MULT VERT OUTPUT V13B 6AQ5
HORIZ AFC V13B 6SN7GTB
HORIZ MULT V15 6SN7GTB
HORIZ OUTPUT V16 6DQ6
HV RECT V18 1B3GT
DAMPER V17 6AU4
PICTURE TUBE V20 21ATP4A
POWER SUPPLY V10 5U4GB
VOLUME
CONTRAST
BRIGHTNESS
FINE TUNING
VERT HOLD
VERT LINEARITY
VERT SIZE
HORIZ HOLD
HORIZ OSC
HORIZ SIZE
BOOST
ION TRAP
DEFLECTION YOKE
TONE
SW ON VOLUME CONTROL
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
ALTERNATE TUNER SCHEMATIC LOCATED ON PAGE 11
DENOTES CHASSIS GROUND
DO NOT MEASURE
Test Receptacle
To Picture Tube Outer Coating
To Junction Of R56 & C63
Tone Control Used in Some Versions
245V SOURCE
215V SOURCE
145V SOURCE
HV TRANSFORMER
TERMINAL BOARD
MEASURED FROM PIN 3 OF V1.
MEASURED FROM CHAS SOURCE.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION.
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. SEE PARTS LIST.
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (LOOKING AT SHAFT TOWARD KNOB END).
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 10 VOLTS PEAK TO PEAK SIGNAL AT PICTURE TUBE.
DC voltage measurements are at 20,000 ohms per volt. AC voltage measured at 1,000 ohms per volt.
Resistors are rounded to a convenient direction in terms of power.
Measured values are from socket pin to common negative unless otherwise stated.
Line voltage maintained at 117 volts for voltage readings.
All controls set for normal operation. No signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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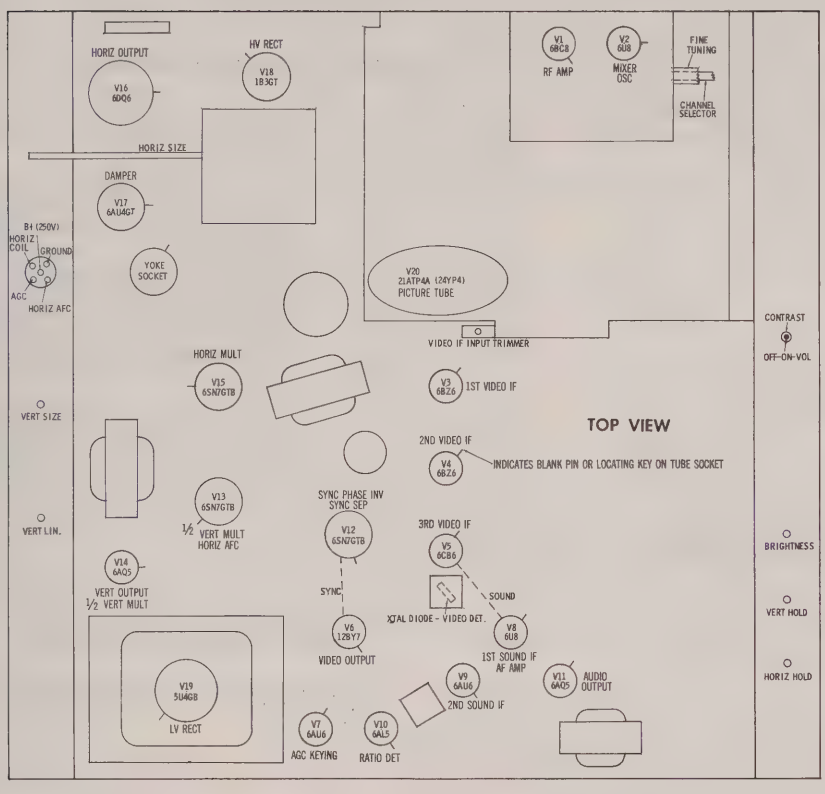
MOTOROLA MODELS Y21K54B, M, Y21K56B, M, Y21K57B, M, MCH, Y21K58B, M, Y21K59M, MCH, Y21T33BG, CH, MG, Y21T33B, M, Y21T36B, M, Y24K14B, M, Y24T6B, M, 21K54B, M, 21K56B, M, 21K57B, M, MCH, 21K58B, M, 21K59M, MCH, 21T33BG, CH, MG, 21T33B, M, 21T36B, M, 24K14B, M, 24T6B, M (Ch. TS-538, Y, VTS-538, Y, WTS-538, Y) Tel. Rec.

MOTOROLA MODELS Y21K54B, M, Y21K56B, M, Y21K57B, M, MCH, Y21K58B, M, Y21K59M, MCH, Y21T33BG, CH, MG, Y21T35B, M, Y21T36B, M, Y24K14B, M, Y24T6B, M, 21K54B, M, 21K56B, M, 21K57B, M, MCH, 21K58B, M, 21K59M, MCH, 21T33BG, CH, MG, 21T35B, M, 21T36B, M, 24K14B, M, 24T6B, M (Ch. TS-538, Y, VTS-538, Y, WTS-538, Y)Tel. Rec.

CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

TUBE PLACEMENT CHART

PROPERTY OF
F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V19, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V7, V20
Has pic, no sound - V8, V9, V10, V11
Overloaded picture - V7

SYNC FAILURE
No vert. sync - V12, V13, V14
No horiz. sync - V12, V13, V15
No vert. or horiz. sync - V12

SWEEP FAILURE
No raster, has sound - V15, V16, V17, V18, V20, Fuse (M2)
No vertical deflection - V13, V14
Poor vert. linearity or foldover - V13, V14
Poor horiz. linearity or foldover - V15, V16, V17
Narrow picture - V15, V16, V17, V19
Vert. off freq. - V12, V13, V14
Horiz. off freq. - V12, V13, V15

MOTOROLA MODELS Y21K54B, M, Y21K56B, M, Y21K57B, M, MCH, Y21K58B, M, Y21K59M, MCH, Y21T33BG, CH, MG, Y21T35B, M, Y21T36B, M, Y24K14B, M, Y24T6B, M, 21K54B, M, 21K56B, M, 21K57B, M, MCH, 21K58B, M, 21K59M, MCH, 21T33BG, CH, MG, 21T35B, M, 21T36B, M, 24K14B, M, 24T6B, M (Ch. TS-538, Y, VTS-538, Y, WTS-538, Y) Tel. Rec.

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To eliminate horizontal interference, remove yoke plug and connect a 1800 ohm, 40 watt resistor from pin 3 to pin 5 of best receptacle.

VIDEO IF ALIGNMENT

Disable the local oscillator by shorting pin 9 of V3 to chassis with a short lead.
If sweep generator has no built-in marker, loosely couple the output of an accurately calibrated AM generator to the video IF strip.
If the coils have two points of response, the correct settings are with the cores away from the center of the coil forms so as not to effect coupling between coil and trap windings.
Connect the negative lead of a 6 volt battery to point Ⓚ. Positive lead to chassis.
Attenuate sweep generator to maintain 3 to 5 volts peak to peak on scope at point Ⓙ.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001M FD	High side to point Ⓙ. Low side to chassis.	44.0MC (10MC Swp)	43.25MC	13	Vert. amp. thru 47K to point Ⓚ. Low side to chassis.	A1	Adjust to place 42.25MC marker at 55% on response curve as in Fig. 1.
2.	"	"	"	45.75MC	"	"	A3, A3	Adjust A3 to place 45.75MC marker at 55% on high side of response curve. Simultaneously adjust A3 for flat-top and symmetrical response similar to Fig. 1.
3.	"	High side to point Ⓙ. Low side to chassis.	"	41.4MC 42.25MC 45.75MC 47.25MC	"	"	A4, A5, A6	Preset A7 by turning away from chassis until the coils effect is moved out of response curve. Adjust A4 and A5 to place markers (42.25MC and 45.75MC) 30% down as in Fig. 2. Increase generator output to observe 41.25MC trap notch. Adjust A6 to place 41.4MC marker in trap notch as in Fig. 3.
4.	"	"	"	41.4MC 42.25MC 45.75MC 47.25MC	"	"	A7, A8, A9	Adjust response curve similar to Fig. 3 with correct markers positioned as shown in Fig. 3. A7 affects the 41.4MC marker. A8 affects the 47.25MC marker. A9 is used to adjust the 42.25MC and 45.75MC markers and the tilt.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Set contrast control at maximum contrast position.
If a 4.5MC signal of crystal accuracy is not available, a TV station signal may be used.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5.	.005M FD	High side to point Ⓙ. Low side to chassis.	4.5MC (sensod)	Any non-interfering channel.	DC probe to point Ⓚ. Common to chassis.	A10, A11, A13	Adjust for maximum deflection with VTVM set to 5 volt scale. Attenuate generator as necessary.
6.	"	"	"	"	DC probe to point Ⓛ. Common to chassis.	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 50% modulation and 450KC sweep. Use 130v sawtooth voltage to scope for horizontal deflection.
Set contrast control at maximum contrast position.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	.005M FD	High side to point Ⓙ. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel.	Vert. amp. to point Ⓚ. Low side to chassis.	A10, A11, A12	Disconnect stabilizer capacitor (C3). Adjust for curve of maximum amplitude and symmetry as in Fig. 4.
6.	"	"	"	"	"	Vert. amp. to point Ⓚ. Low side to chassis.	A13	Reconnect C3. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 5. Retouch A10 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Set contrast control at maximum contrast position.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.005M FD	High side to point Ⓙ. Low side to chassis.	4.5MC (sensod)	Any non-interfering channel.	DC probe thru detector (Fig. 6) to pin 11 (cathode) of picture tube. Low side to chassis.	A14	Adjust for MINIMUM deflection on VTVM.

ALTERNATE 4.5MC TRAP ALIGNMENT

Tune in a local TV station. Adjust the fine tuning control until a noticeable 4.5MC beat appears in the picture. Adjust A14 so that the core is approximately centered between the two points where the 4.5MC beat appears in the picture.

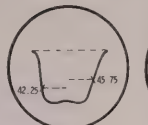


FIG. 1

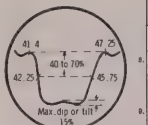


FIG. 2

FIG. 3

FIG. 4

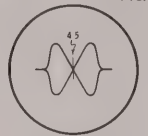


FIG. 5

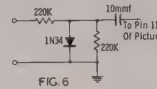


FIG. 6

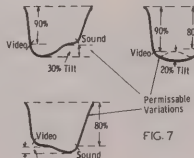


FIG. 7

FIG. 8

Permissable placement of sound markers with tuner shield removed.

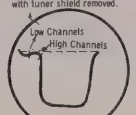


FIG. 9

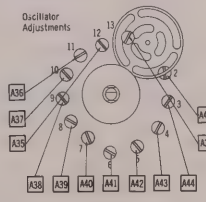


FIG.10

VHF RF AND MIXER ALIGNMENT

Adjust the oscilloscope for a 2 inch deflection with 1.5 volt peak to peak signal.
If sweep generator has no built-in marker, loosely couple a separate marker generator to the antenna terminals. Adjustments are into A18 are adjusted by expanding or compressing coil turns.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. amp. thru 47K to point Ⓚ. Low side to chassis.	A15, A16	Preset adjustments A17 and A18 at mid-capacity. Preset A46 for maximum inductance. (Core fully clockwise.) Adjust A15 and A16 for maximum amplitude and response similar to Fig. 7.
9.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7	"	A17, A18	Adjust for maximum amplitude, correct tilt and correct marker position as in Fig. 7.
10.	"	"	207MC (10MC Swp) 201MC (10MC Swp)	205.25MC 208.75MC 199.25MC 203.75MC	12 11	"		Check for response curve on each channel. If response is not within limits on each channel, repeat steps 8 and 9. If necessary, make compromise adjustments of A15 thru A18.
			195MC (10MC Swp) 189MC (10MC Swp)	193.25MC 197.75MC 187.25MC 191.75MC	10 9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
11.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A19, A20, A21	Adjust A19, A20 and A21 in this order for response curve similar to Fig. 8. Adjust A19 and A20 for correct marker positions. Adjust A21 for maximum gain and MINIMUM tilt.
12.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A22, A23, A24	Adjust for response curve similar to Fig. 8. Adjust A22 and A23 for correct marker positions and A24 for maximum gain and MINIMUM tilt.
13.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"	A25, A26, A27	Adjust for response curve similar to Fig. 8. Adjust A25 and A26 for correct marker positions and A27 for maximum gain and MINIMUM tilt.
14.	"	"	63MC (10MC Swp)	61.25MC 65.75MC	3	"	A28, A29, A30	Adjust for response curve similar to Fig. 8. Adjust A28 and A29 for correct marker positions and A30 for maximum gain and MINIMUM tilt.
15.	"	"	57MC (10MC Swp)	55.25MC 59.75MC	2	"	A31, A32, A33	Adjust for response curve similar to Fig. 8. Adjust A31 and A32 for correct marker positions and A33 for maximum gain and MINIMUM tilt.

VHF OSCILLATOR ALIGNMENT

Replace the 8 volt bias as under "Video IF Alignment". Use only enough sweep generator output from generator to produce usable pattern on scope. See Fig. 10 for adjustments.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp) 207MC (10MC Swp)	211.25MC 215.75MC 205.25MC 209.75MC	13 12	Vert. amp. thru 47K to point Ⓚ. Low side to chassis.	A34 A35	Adjust to place sound marker in trap notch as in Fig. 9. Video marker should fall at 50%.
			201MC (10MC Swp) 195MC (10MC Swp)	199.25MC 203.75MC 193.25MC 197.75MC	11 10		A36 A37	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A38	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A39	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A40	
			201MC (10MC Swp)	85.25MC 87.75MC	6		A41	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A43	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A43	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A44	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A45	

45.0MC TRAP ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

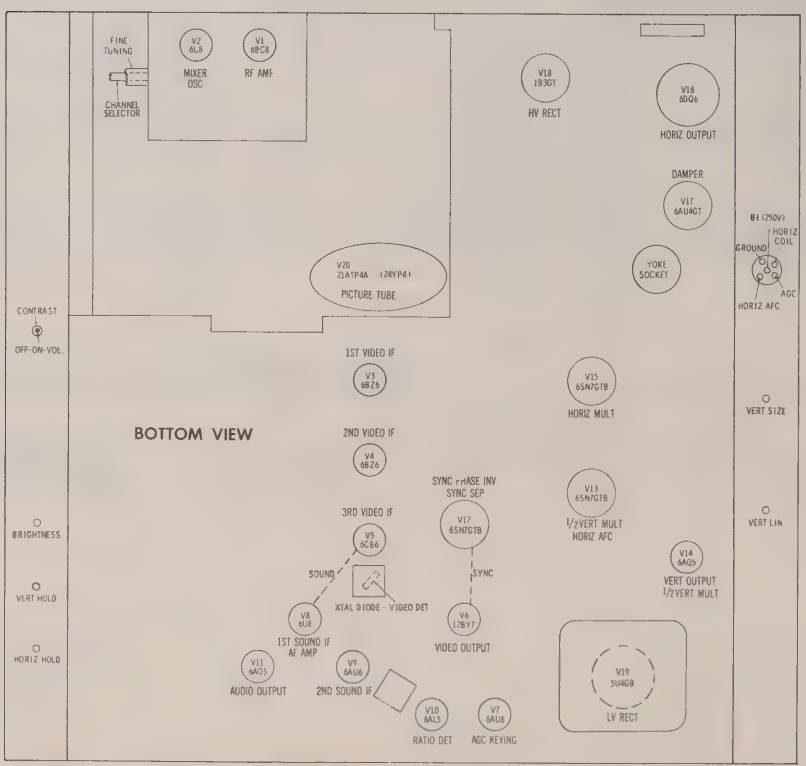
	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
17.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	45.0MC (10MC Swp)	45.0MC	3	Vert. amp. thru 47K to point Ⓚ. Low side to chassis.	A46	Increase sweep generator output to produce visible marker on scope. Adjust A46 for MINIMUM response at 45.0MC.

MOTOROLA MODELS T21K548B, M, T21K548N, M, T21K547B, M, MCH, T21K549N, MCH, T21T338D, CH, MG, T21T339B, M, T21T340B, M, T24K148, M, T24T04B, M, 21K548, M, 21K549, M, 21K549N, M, 21K547B, M, MCH, T25-538, Y, VT5-538, Y, WT5-538, Y, T21K548N, MCH, T21T338D, CH, MG, T21T339B, M, T21T340B, M, T24K148, M, T24T04B, M, 21K548, M, 21K549, M, 21K549N, M, 21K547B, M, MCH, T25-538, Y, VT5-538, Y, WT5-538, Y, T21K548N, MCH, T21T338D, CH, MG, MCH, 21T339B, M, 21T340B, M, 24K148, M, 24T04B, M, CH, T25-538, Y, VT5-538, Y, WT5-538, Y, T21K548N, MCH, T21T338D, CH, MG,

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BC8	†1400Ω	INF	INF	0Ω	.1Ω	INF	1.8Meg	0Ω	0Ω
V2	6U8	†12K	43K	†270K	0Ω	.1Ω	†15K	0Ω	0Ω	15K
V3	6BZ6	330K	47Ω	0Ω	.1Ω	†10K	†10K	0Ω		
V4	6BZ6	330K	47Ω	0Ω	.1Ω	†10K	†10K	0Ω		
V5	6CB6	1200Ω	120Ω	.1Ω	0Ω	■ 220Ω	†39K	0Ω		
V6	12BY7	30Ω	72K	0Ω	0Ω	0Ω	.1Ω	†3900Ω	■ 0Ω	0Ω
V7	6AU6	†37K	†3300Ω	.1Ω	.5Ω	1.2Meg	†68K	†3300Ω		
V8	6U8	†56K	■220Ω	†270Ω	.1Ω	0Ω	†270Ω	■ 370Ω	0Ω	10Meg
V9	6AU6	■15K	■440Ω	.1Ω	0Ω	†270Ω	†270Ω	■ 440Ω		
V10	6AL5	1Meg	1Meg	.1Ω	0Ω	6800Ω	0Ω	6800Ω		
V11	6AQ5	470K	330Ω	0Ω	.1Ω	†1000Ω	†500Ω	470K		
V12	6SN7GTB	1.8Meg	■1Meg	30Ω	20K	†30K	2200Ω	.1Ω	0Ω	
V13	6SN7GTB	1.6Meg	*1.3Meg	0Ω	320K	22K	120K	.1Ω	.5Ω	
V14	6AQ5	1.5Meg	0Ω	0Ω	.1Ω	†600Ω	†200Ω	1.5Meg		
V15	6SN7GTB	70K	†120K	1000Ω	5Meg	†11K	1000Ω	0Ω	.1Ω	
V16	6DQ6	TP	.1Ω	TP	†15K	1Meg	TP	0Ω	0Ω	TOP CAP *13Ω
V17	6AU4GT	NC	TP	200K	NC	†50Ω	TP	0Ω	.1Ω	
V18	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			TOP CAP *180Ω
V19	5U4GB	NC	60K	NC	14Ω	NC	15Ω	NC	60K	
V20	21ATP4A	0Ω	80K	Pin 6 *360K	Pin 10 *360K	Pin 11 †210K	Pin 12 .1Ω			

† MEASURED FROM PIN 2 OF V19.
■ MEASURED FROM 145V LINE
* MEASURED FROM PIN 3 OF V17.
NC NO CONNECTION
TP TIE POINT



TUBE PLACEMENT CHART

DENVER, COLORADO

CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

MOTOROLA MODELS Y21K54B, M, Y21K56B, M, Y21K57B, M, MCH, Y21K58B, M, Y21K59M, MCH, Y21T33BG, CH, MG, Y21T35B, M, Y21T36B, M, Y24K14B, M, Y24T6B, M, 21K54B, M, 21K56B, M, 21K57B, M, MCH, 21K58B, M, 21K59M, MCH, 21T33BG, CH, MG, 21T35B, M, 21T36B, M, 24K14B, M, 24T6B, M (Ch. TS-538, Y, VTS-538, Y, WTS-538, Y) Tel. Rec.

PROPERTY OF
L. D. BLANKENSHIP

VHF Tuner Part No. TT-834 Used With Chassis TS-538Y, VTS-538Y, and WTS-538Y

ALTERNATE TUNER SCHEMATIC

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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MOTOROLA MODELS Y21K54B, M, Y21K56B, M, Y21K57B, M, MCH, Y21K58B, M, Y21K59M, MCH, Y21T33BG, CH, MG, Y21T35B, M, Y21T36B, M, Y24K14B, M, Y24T6B, M, 21K54B, M, 21K56B, M, 21K57B, M, MCH, 21K58B, M, 21K59M, MCH, 21T33BG, CH, MG, 21T35B, M, 21T36B, M, 24K14B, M, 24T6B, M (Ch. TS-538, Y, VTS-538, Y, WTS-538, Y) Tel. Rec.

PARTS LIST AND DESCRIPTIONS

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Motorola PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L40	RF Choke	1.6Ω		24A733225	19-1005		4612	10 Microhenries
L41	RF Choke	1.6Ω		24A733225	19-1005		4612	10 Microhenries

Note 1: Complete coil and wafer assembly. Includes L1, L2, L3, L4, L5, C4, C5 and C6. Part #1V738869.
Note 2: Complete coil and wafer assembly. Includes L8, L9, C23 and C12. Part #1V738858.
Note 3: Complete coil and wafer assembly. Includes L10, L11 and C14. Part #1V738859.
Note 4: Complete coil and wafer assembly. Includes L12 thru L17, C17, C18, R17 and fine tuning cap. Part #1V738861.
* Parallel with 5600Ω resistor.
■ Parallel with 2700Ω resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Motorola PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	
L42	37Ω		1V739709	19-1576	TV-163	6210			HS-5	Core part #46A780344

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	Motorola PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L43	.310A	49Ω	1.54HY	25K738763	C5037 ①	C-2996①	C-2326 ①	26C44	C-17X ①

① Drill one new mounting hole.

FUSES

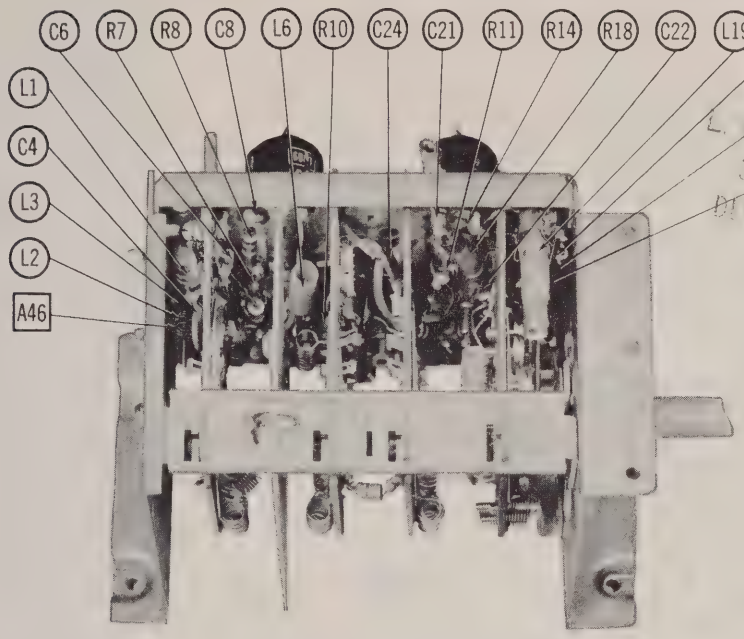
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Motorola PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1			1" piece #26 wire					
M2	3AG S/B	3/10A 125V			313.300 (3AG-S/B-3/10A)	357001	MDL 3/10	4405

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		
		Motorola PART No.	SYLVANIA PART No.	NOTES
M3		48C739300 48K733204	1N60	Video Det. (Clip In) (Pigtail) Alternate part used in some versions.

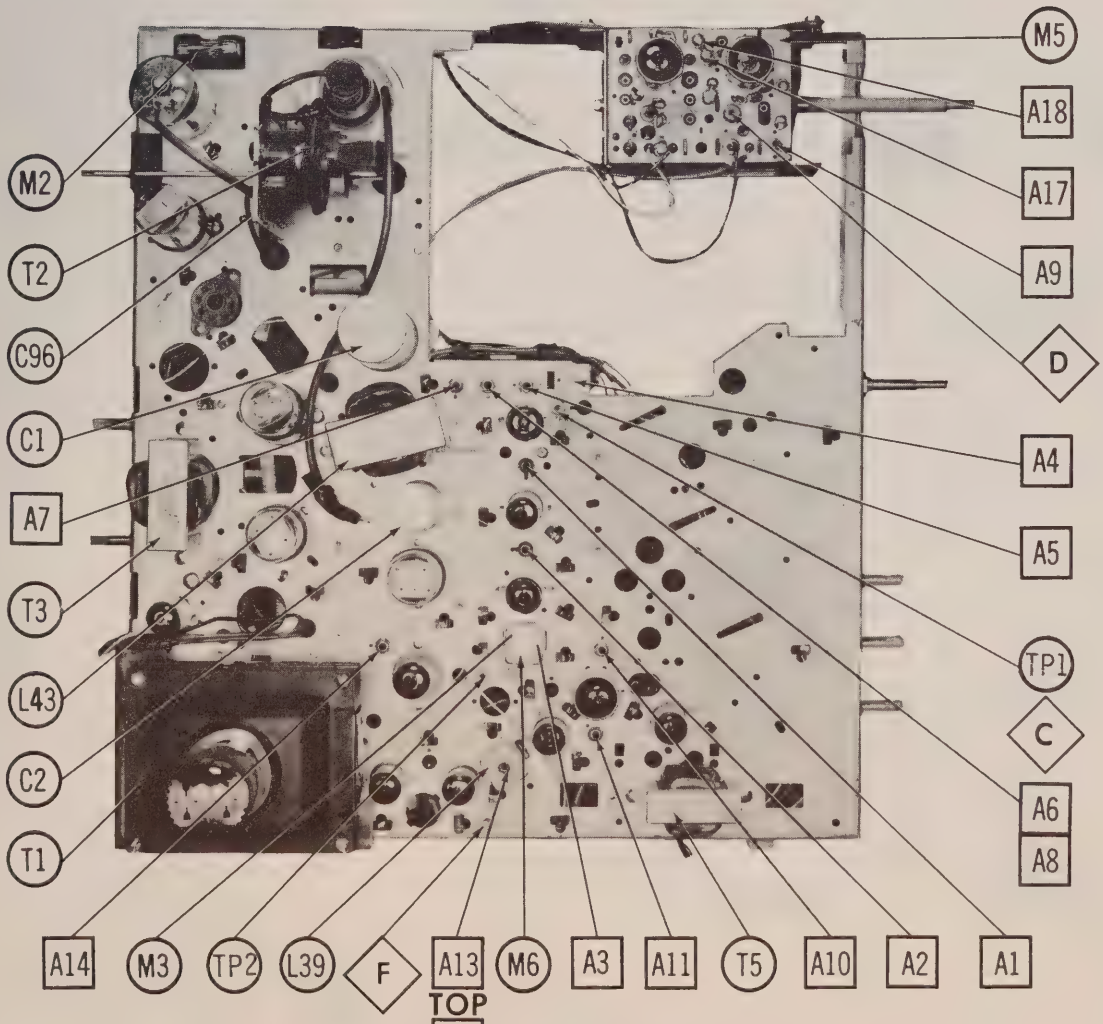
MISCELLANEOUS

ITEM No.	PART NAME	Motorola PART No.	NOTES
M4	Lamp	65X10867	#44 - Used in chassis WTS & VTS-538 only.
M5	Tuner		TT-83A VHF.
	Tuner	1U738854	TT-83. VHF. Used in chassis TS-538, VTS-538 & WTS-538.
	Tuner	1U738900	TT-83Y. VHF. Used in chassis TS-538Y, VTS-538Y & WTS-538Y.
	Tuner		TT-87. UHF. Used in chassis TS-538Y, VTS-538Y & WTS-538Y.
M6	Video Det. Ass'y.	24C739298	Includes 5.6MMF, 10MMF Caps., Crystal Diode Part No. 48C739300 & 4th Video IF Trans.
	Video Det. Ass'y.	24K737340	Includes 5.6MMF, 10MMF Caps., Crystal Diode Part No. 48K733204 & 4th Video IF Trans.
M7	Switch	40B736126	On-Off Push Type
M8	Centering Device	48A721145	Includes Yoke Cover
M9	Ion Trap	59K734028	
M10	Correction Magnet	48B737365	Alternate part #48B737087
M11	Correction Magnet	48B737265	Alternate part #48B737087.
A4	Trimmer Cap.	20A736287	IF Link. 20-140MMF
	Knob	36C738680	Fine Tuning - Models 21K54B, M, Y21K54B, M, 21T33BG, CH, MG, Y21T33BG, CH, MG, 21T35B, M, Y21T35B, M.
	Knob	36C738713	Fine Tuning - Models 21K56B, M, Y21K56B, M, 2kL57B, M, MCH, Y21K57B, M, MCH, 21K58B, M, Y21K58B, M, 21K59M, MCH, Y21K59M, MCH, 24K14B, M, Y24K14B, M, 21T36B, M, Y21T36B, M, 24T6B, M, Y24T6B, M.
	Knob	36K738682	VHF Channel Selector - Models 21K54B, M, 21T33BG, CH, MG, 21T35B, M.
	Knob	36C738681	VHF Channel Selector - Models Y21K54B, M, Y21T33BG, CH, MG, Y21T35B, M.
	Knob	36K738936	VHF Channel Selector - Models 21K56B, M, 21K57B, M, MCH, 21K58B, M, 21K59M, MCH, 24K14B, M, 21T36B, M, 24T6B, M.
	Knob	36C738935	VHF Channel Selector - Models Y21K56B, M, Y21K57B, M, MCH, Y21K58B, M, Y21K59M, MCH, Y24K14B, M, Y21T36B, M, Y24T6B, M.
	Knob	36B738679	Contrast - Models 21K54B, M, Y21K54B, M, 21T33BG, CH, MG, Y21T33BG, CH, MG, 21T35B, M, Y21T35B, M.
	Knob	36B738701	Contrast - Models 21K56B, M, Y21K56B, M, 21K57B, M, MCH, Y21K57B, M, MCH, 21K58B, M, Y21K58B, M, 21K59M, MCH, Y21K59M, MCH, 24K14B, M, Y24K14B, M, 21T36B, M, Y21T36B, M, 24T6B, M, Y24T6B, M.
	Knob	36B738676	Horiz. Hold, Vert. Hold & Brightness - Models 21K54B, M, Y21K54B, M, 21T33BG, CH, MG, Y21T33BG, CH, MG, 21T35B, M, Y21T35B, M.
	Knob	36B738714	Horiz. Hold, Vert. Hold & Brightness - Models 21K56B, M, Y21K56B, M, 21K57B, M, MCH, Y21K57B, M, MCH, 21K58B, M, Y21K58B, M, 21K59M, MCH, Y21K59M, MCH, 24K14B, M, Y24K14B, M, 21T36B, M, Y21T36B, M, 24T6B, M, Y24T6B, M.
	Knob	36B738678	Volume - All Models
	Safety Glass	61K736858	Models 21K54B, M, Y21K54B, M, 21T33BG, CH, MG, Y21T33BG, CH, MG.
	Safety Glass	61D738459	Models 21K56B, M, Y21K56B, M, 21K57B, M, MCH, Y21K57B, M, MCH, 21K58B, M, Y21K58B, M, 21K59M, MCH, Y21K59M, MCH, 21T36B, M, Y21T36B, M.
	Safety Glass	61K738649	Models 24K14B, M, Y24K14B, M, 24T6B, M, Y24T6B, M.



PROPERTY OF
L. F. DARKENSHIP
MEADE ST.
DENVER, COLORADO

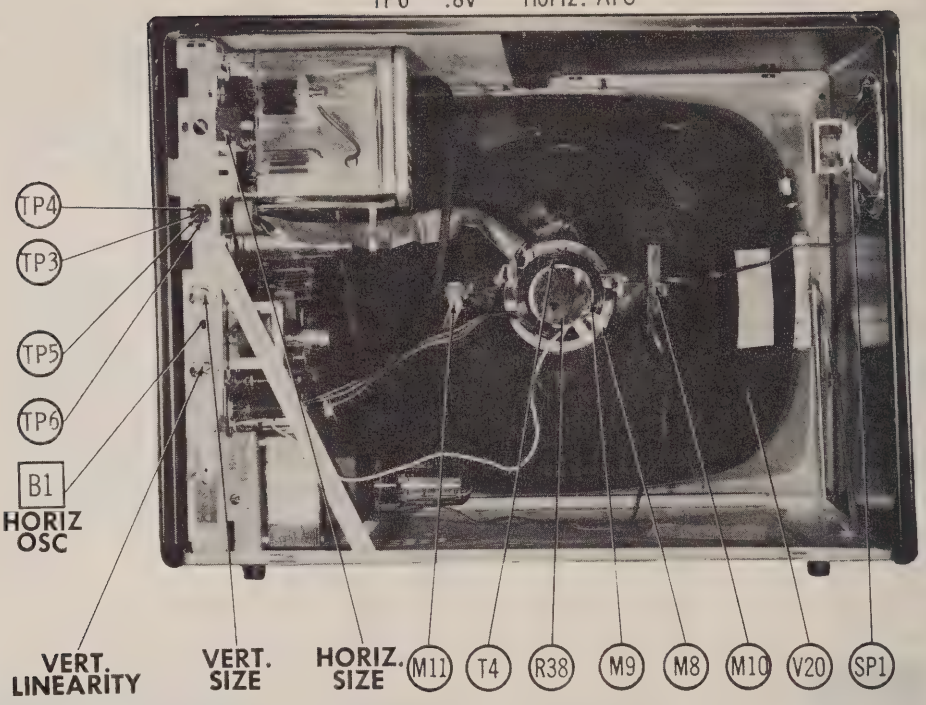
RF TUNER-LEFT SIDE



TP1 -.4V IF AGC
TP2 -.3V VIDEO DET. OUTPUT

CHASSIS TOP VIEW

TP3	245V	High B+
TP4	215V	B+
TP5	-.4V	IF AGC
TP6	.8V	Horiz. AFC



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Adjust the brightness and contrast controls for a normal picture.

1. Connect a piece of wire from pin 4 of the service test receptacle to chassis, thereby, grounding the AFC coil.

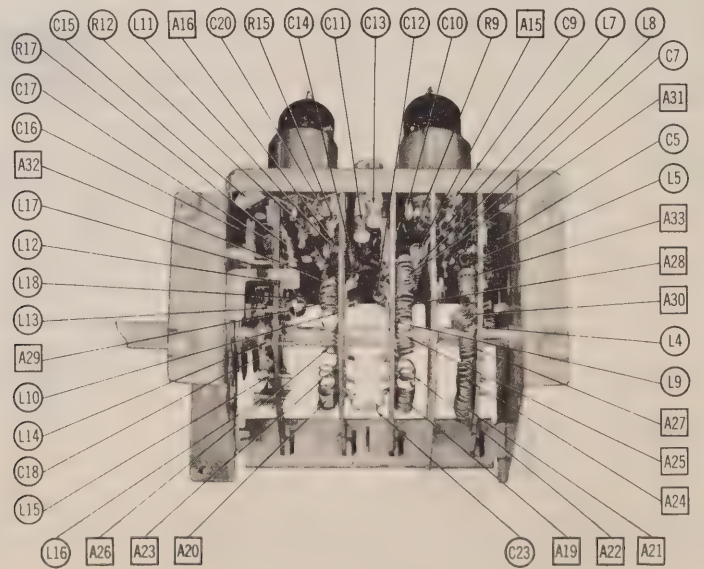
2. Connect a .1MFD capacitor from pin 2 of the service test receptacle to chassis, thereby, shunting the horizontal oscillator coil.

3. Adjust the horizontal hold control to the point where the picture remains stationary horizontally.

4. Remove .1MFD capacitor from pin 2 of the service test receptacle and adjust the horizontal oscillator slug (B1) to the point where the picture remains stable horizontally.

5. Remove the short from the AFC coil (pin 4 of the service receptacle) and adjust the horizontal hold control until the picture remains in sync over 30 degrees of its range while switching off channel and back again.

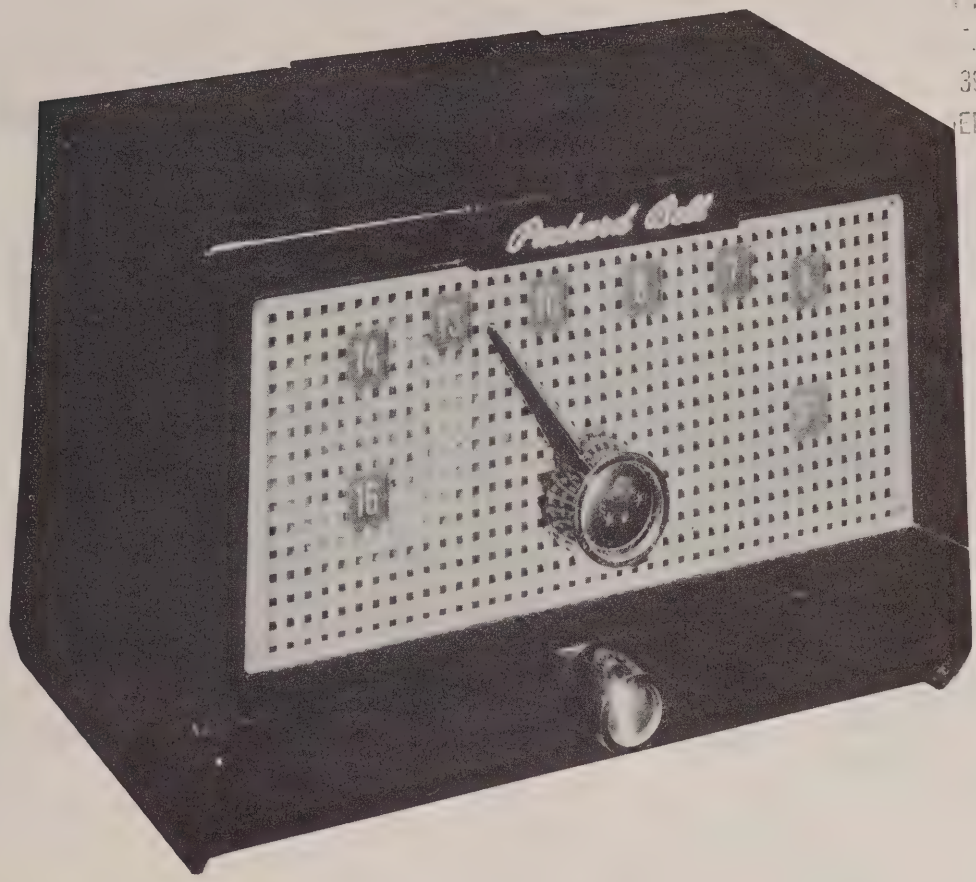
6. Adjust horizontal size control (located on the rear of the set) for a picture slightly wider than necessary to fill the picture mask horizontally.



RF TUNER RIGHT SIDE

PROPERTY OF
[illegible] BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PACKARD-BELL
MODEL 5R1



PACKARD-BELL
MODEL 5R1

TRADE NAME	Packard-Bell Model 5R1
MANUFACTURER	Packard-Bell Co. -Service Div., 11th & Hope Sts., Los Angeles 15, Calif.
TYPE SET	AC-DC Operated AM Receiver
TUBES (Five)	Types 12BE6 Converter, 12BA6 IF Amplifier, 12AV6 Det-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC
RATING	.25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod)	540KC	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	High side thru dummy to antenna clip. Low side to B-.	1620KC	Tuning gang fully open.	"	A5	"
3.	"	"	1500KC	Tune to 1500KC signal.	"	A6	"

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	12BE6	
V2	IF Amplifier	12BA6	
V3	Det-AVC-AF Amp.	12AV6	
V4	Output	50C5	
V5	Rectifier	35W4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Packard-Bell PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	40	150	24090	PRS150V4020	BBRD4215	TCD485	TDLD-5	FMD-302	TVA-2438
B	20	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Packard-Bell PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.047	200	23705	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C3	51		23912	NP0-S151	TCZ-51	Z035	NP0-338-510	ZT-545	5TCC-Q5	
C4	220		23915	SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C5	5000		23931	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C6	420		23916	BPD-00047	D6-401	G059	811-471	UC-5347	5GA-T47	
C7	10000		23939	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C8	10000		23939	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C9	.047	200	23705	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C10	.15	200	23708	P288N-15		CUB4P15		PT4015	2TM-P15	

CONTROLS

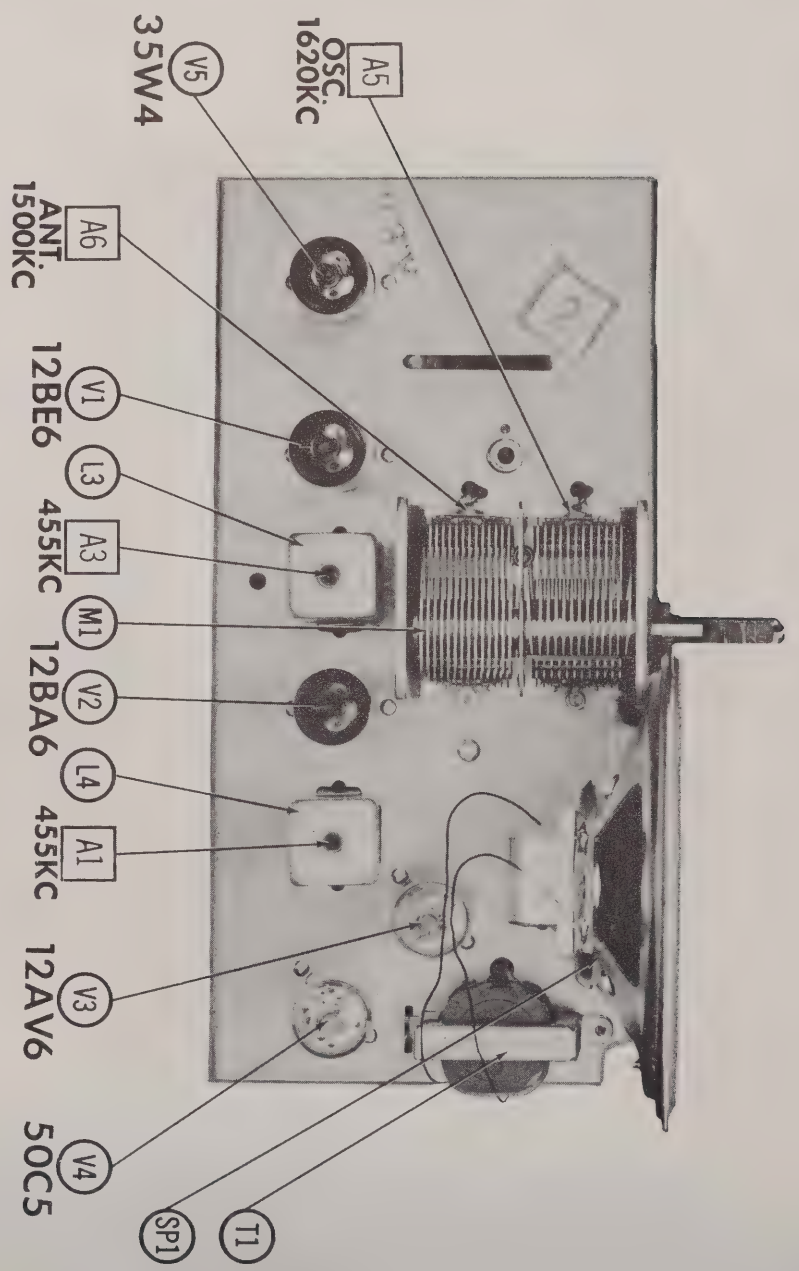
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Packard-Bell PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	PB-25027	BSK-60-S	A47-500K-Z	Q13-133	U48	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	Not Req.	SWE-12	76-1	US-26	Attach to R1A

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Packard-Bell PART No.	IRC PART No.	
R2	22K		73141	BTS-22K	
R3	220Ω		73017	BTS-220	
R4	2.2Meg		73165	BTS-2.2Meg	
R5	4.7Meg		73169	BTS-4.7Meg	
R6	220K		73153	BTS-220K	
R7	470K		73157	BTS-470K	
R8	150Ω		73115	BTS-150	
R9	1000Ω	1	73325	BTA-1000	
R10	68Ω		73111	BTS-68	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Packard-Bell PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2650Ω	3-4Ω	89417A	Z1101	A-3025	A-3332	26S58	S-12X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Packard-Bell PART No.	QUAM PART No.	RCA TYPE No.	
SP1	4"	PM	3-4Ω	83014	4A07	223S1	

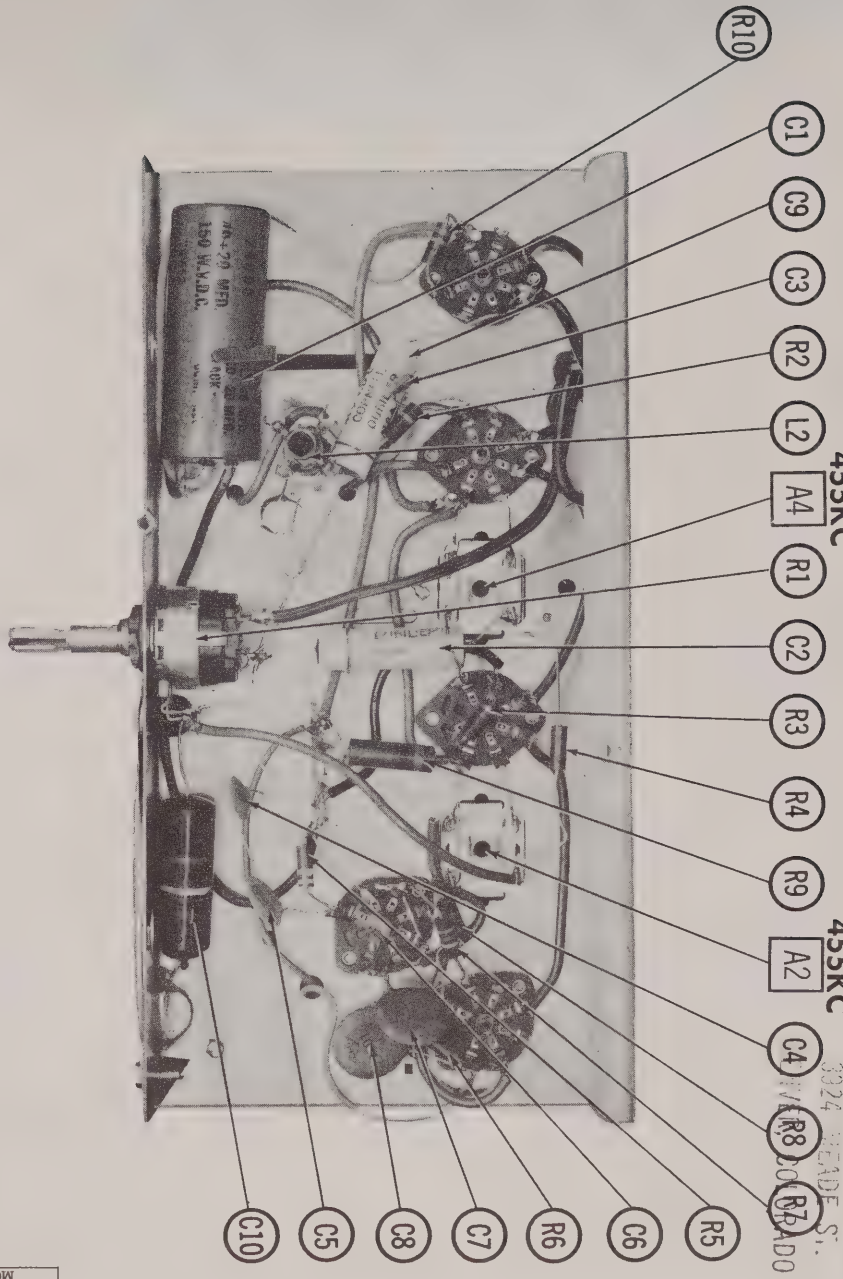
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Packard-Bell PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.5Ω		29331				
L2	Osc. Coil	.6Ω	8.5Ω	29229A				
L3	Input IF	18Ω	18Ω	29077	16-6758	BC-352	12-C1	
L4	Output IF	18Ω	18Ω	29078	16-6758	BC-353	12-C2	

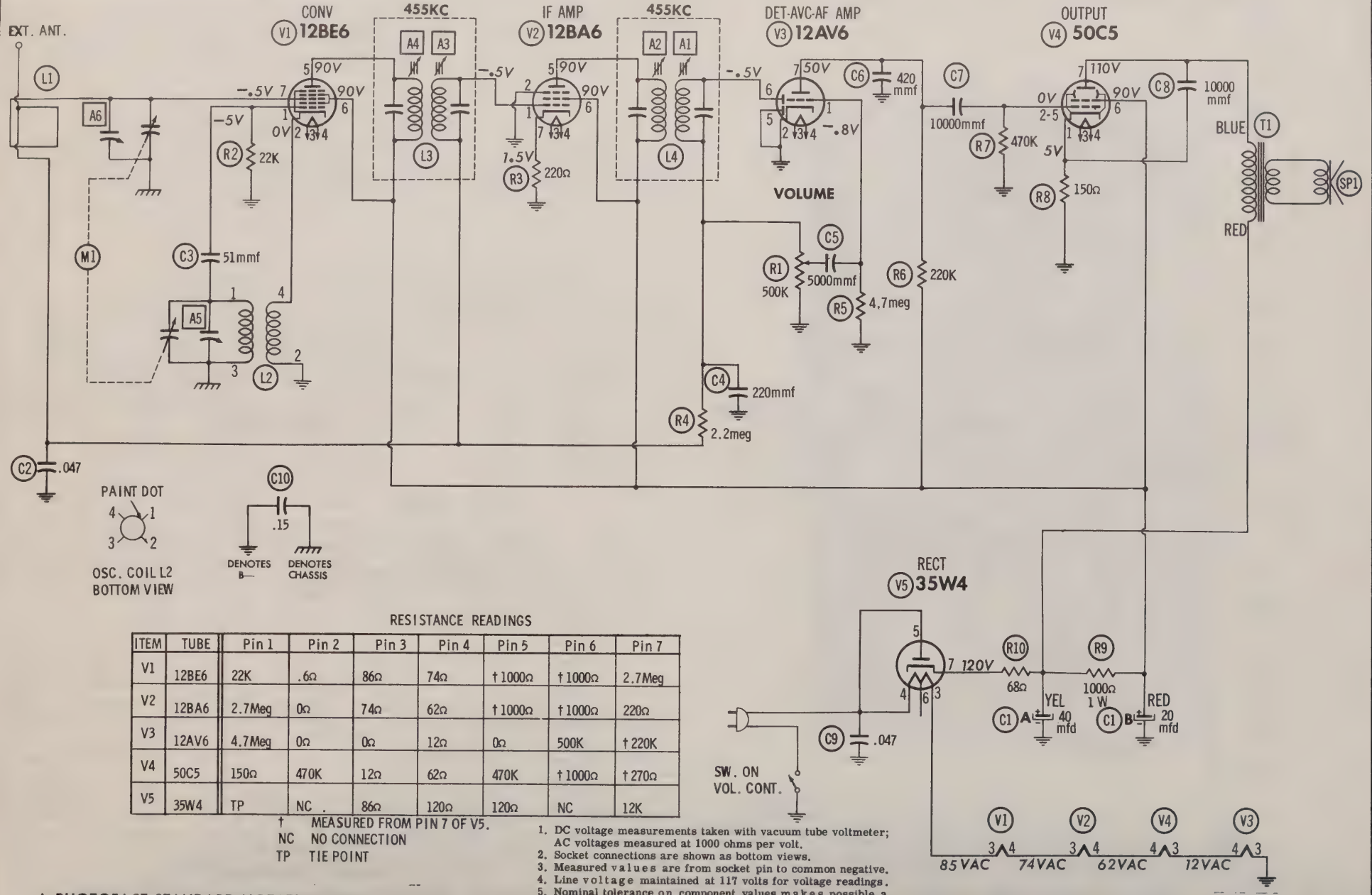
MISCELLANEOUS

ITEM No.	PART NAME	Packard-Bell PART No.	NOTES
M1	Tuning Cap.	23528D	2 Gang (30-455MMF;30-180MMF)
	Cabinet	21131A	Specify Color
	Knob	52083	On-Off-Volume (Specify Color)
	Knob	52082	Tuning (Specify Color)
	Dial	38150	

CHASSIS—BOTTOM VIEW



PACKARD-BELL
MODEL 5RI



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	22K	.6Ω	86Ω	74Ω	†1000Ω	†1000Ω	2.7Meg
V2	12BA6	2.7Meg	0Ω	74Ω	62Ω	†1000Ω	†1000Ω	220Ω
V3	12AV6	4.7Meg	0Ω	0Ω	12Ω	0Ω	500K	†220K
V4	50C5	150Ω	470K	12Ω	62Ω	470K	†1000Ω	†270Ω
V5	35W4	TP	NC	86Ω	120Ω	120Ω	NC	12K

† MEASURED FROM PIN 7 OF V5.
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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343-9

SYLVANIA MODEL 1102 (Ch. 1-607-4)

PROPERTY OF
L. F. E. [illegible]KENSHIP
3924 MENDE ST.
DENVER, COLORADO

SYLVANIA MODEL 1102 (Ch. 1-607-4)

SYLVANIA MODEL 1102 (Ch. 1-607-4)

TRADE NAME	Sylvania Model 1102 (Ch. 1-607-4)
MANUFACTURER	Sylvania Electric Prod., Inc., Radio & Tel. Div., 254 Rano St., Buffalo 7, N. Y.
TYPE SET	AC-DC Operated AM Receiver and Intercommunications System
TUBES (Five)	Types 12BE6 Converter, 12BA6 IF Amplifier, 12AT6 Det-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-DC RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC - 1650KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1650KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1500KC	Tune to 1500KC signal.	"	A6	"

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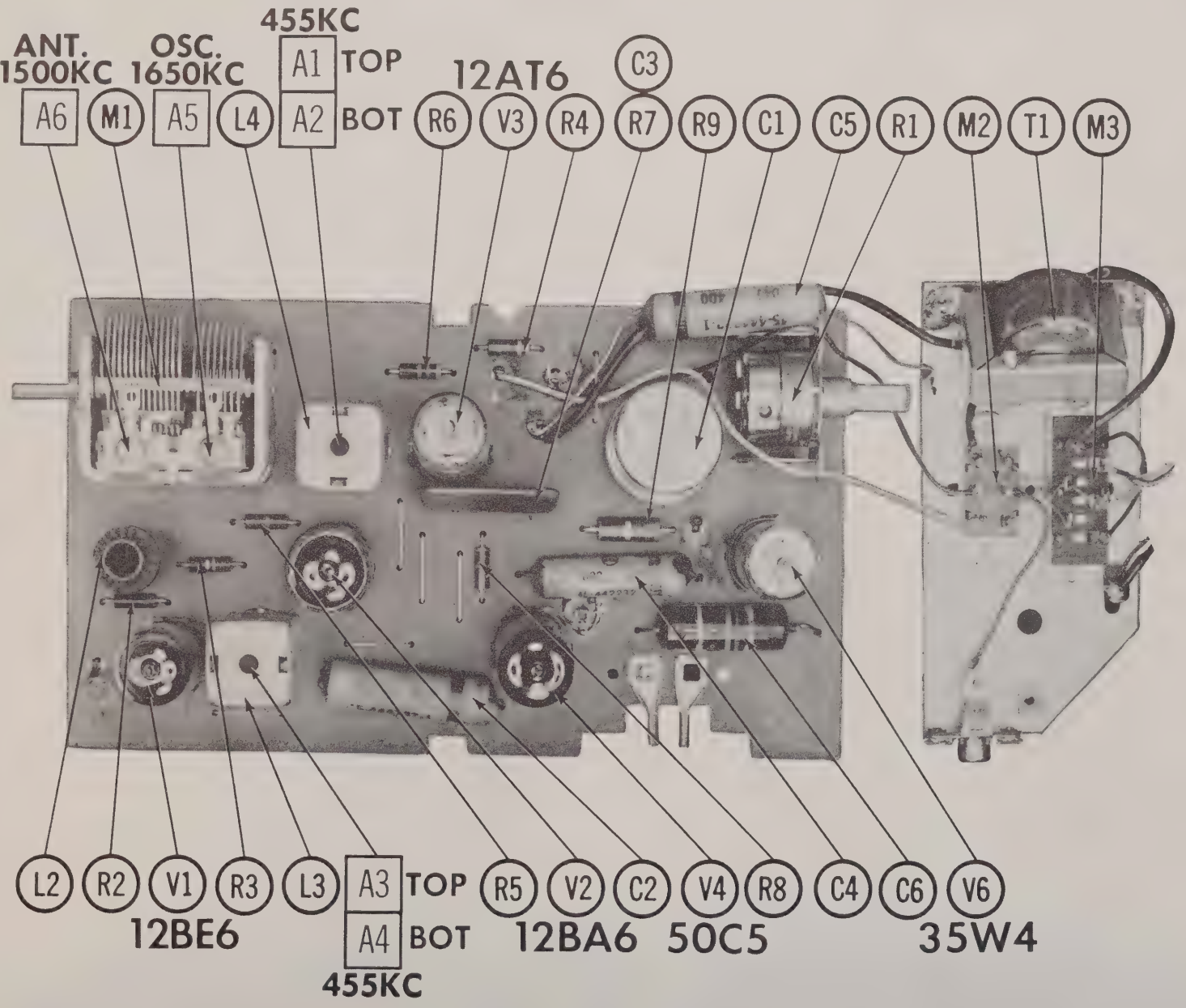


CHASSIS-TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	12BE6	
V2	IF Amplifier	12BA6	
V3	Det-AVC-AF Amp.	12AT6	
V4	Output	50C5	
V5	Rectifier	35W4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA SYLVANIA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■70	150	161-2016	AFH2-19	XBO181	FP216	TMD-16	D-085	TVL-2439
B	▲30	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA SYLVANIA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	.047	400	169-0021	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C3A	125									
B	5000									
C	5000		†190-0021							
D	100									
E										
C4	.022	400	169-0022	BPD-02	DF-203	CUB4S22	817-02	PT4122	4TM-S22	
C5	.047	400	169-0021	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C6	.047	400	169-0021	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	

† Items C3A, C3B, C3C, C3D, C3E, R7A, R7B and R7C are combined in one unit. When replacing items separately, C3D and C3E should total 100MMF.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA SYLVANIA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	500K	½	157-0041					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA SYLVANIA PART No.	IRC PART No.	NOTES
R2	22Ω		181-0220	BTS-22	
R3	22K		181-0223	BTS-22K	
R4	3.3Meg		181-0335	BTS-3.3Meg	
R5	220Ω		181-0221	BTS-220	
R6	47K		181-0473	BTS-47K	
R7A	6.8Meg		†190-0021	BTS-6.8Meg	
B	470K			BTS-470K	
C	470K			BTS-470K	
R8	150Ω		181-0151	BTS-150	
R9	1200Ω	1	182-0122	BTA-1200	

† Items R7A, R7B, R7C, C3A, C3B, C3C, C3D and C3E are combined in one unit.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (INPUT)

ITEM No.	RESISTANCE PRI.	RESISTANCE SEC.	REPLACEMENT DATA SYLVANIA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	.62Ω	1700Ω	143-0050						
	Turns Ratio 1 : 200								

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA SYLVANIA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	2450Ω	3-4Ω	143-0049	Z1101	A-3025	A-3332	26S58	S-12X	

SPEAKER

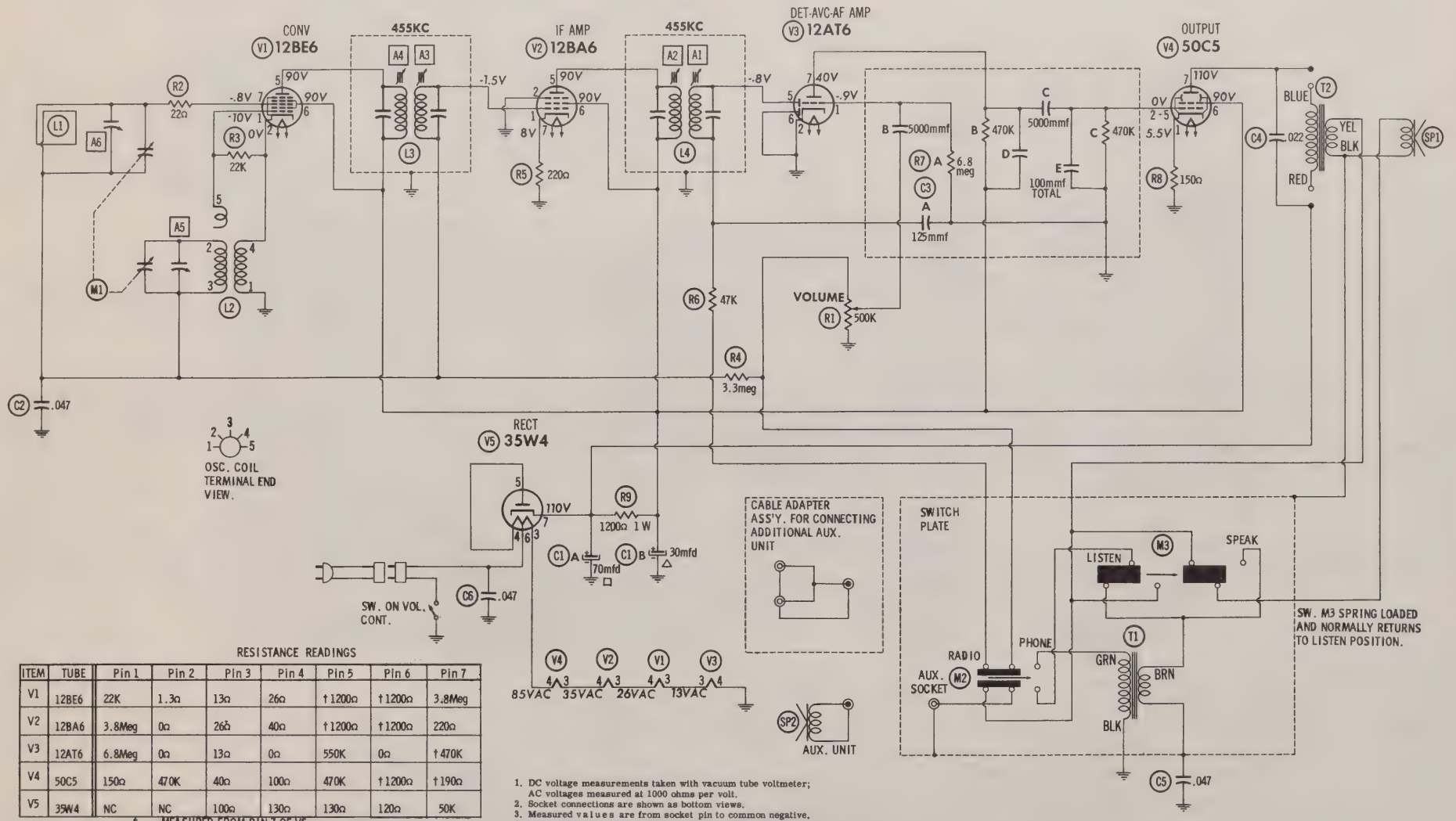
ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA SYLVANIA PART No.	QUAM PART No.	RCA TYPE No.	NOTES
SP1	4"	PM	3-4Ω	539-0409	4A07	223S1	① Auilxiliary Speaker
SP2	4"	PM	3-4Ω	539-0410 ①	4A07	223S1	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA SYLVANIA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Loop Ant.	2.9Ω		582-0025				
L2	Osc. Coil	1.1Ω	7.8Ω	113-0033				
L3	Input IF	15Ω	15Ω	121-0027	16-6780		13-PC1	
L4	Output IF	15Ω	15Ω	121-0027	16-6780		13-PC2	

MISCELLANEOUS

ITEM No.	PART NAME	SYLVANIA PART No.	NOTES
M1	Tuning Cap.	170-0019	2 Gang
M2	Switch	572-0006	Radio-Phone (DPDT-Slide Type)
M3	Switch	572-0007	Listen-Speak (DPDT-Slide Type)
	Cabinet	813-0085	Radio Unit, Model 1102GR (Green)
	Cabinet	813-0087	Radio Unit, Model 1102RE (Red)
	Cabinet	813-0089	Radio Unit, Model 1102H (Ivory)
	Cabinet	813-0084	Auxiliary Unit, Model 1102GR (Green)
	Cabinet	813-0086	Auxiliary Unit, Model 1102RE (Red)
	Cabinet	813-0088	Auxiliary Unit, Model 1102H (Ivory)
	Knob	740-0085	Tuning, Model 1102GR (Green)
	Knob	740-0088	Tuning, Model 1102RE (Red)
	Knob	740-0087	Tuning, Model 1102H (Ivory)
	Knob	740-0094	On-Off-Volume, Model 1102GR (Green)
	Knob	740-0093	On-Off-Volume, Model 1102RE (Red)
	Knob	740-0095	On-Off-Volume, Model 1102H (Ivory)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	22K	1.3Ω	13Ω	26Ω	†1200Ω	†1200Ω	3.8Meg
V2	12BA6	3.8Meg	0Ω	26Ω	40Ω	†1200Ω	†1200Ω	220Ω
V3	12AT6	6.8Meg	0Ω	13Ω	0Ω	550K	0Ω	†470K
V4	50C5	150Ω	470K	40Ω	100Ω	470K	†1200Ω	†190Ω
V5	35W4	NC	NC	100Ω	130Ω	130Ω	120Ω	50K

† MEASURED FROM PIN 7 OF V5.
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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TELEFUNKEN
MODEL "Elite"

PROPERTY OF
F. C. [illegible] SONS
3924 MEADE ST.
DENVER, COLORADO

TELEFUNKEN
MODEL "Elite"

TELEFUNKEN
MODEL "Elite"

TRADE NAME	Telefunken Model "Elite"
SUPPLIER	American Elite, Inc., 7 Park Ave., New York, N. Y.
TYPE SET	AC-Battery Operated FM-SB-SW Portable Receiver
TUBES (Seven)	Types DC90 FM Converter, DF96 1st FM IF Amp. -SB-SW RF Amp., DK96 2nd FM IF Amp. - SB-SW Mixer-Osc., DF96 3rd FM IF Amp. -1st SB-SW IF Amp., DF96 4th FM IF Amp. - 2nd SB-SW IF Amp., DAF96 SB-SW Det-AVC-AF Amp., DL94 Output
POWER SUPPLY	110-125-150-220 Volts AC (or) 1.5 Volts "A" Supply & 90 Volts "B" Supply
RATING	.11 Amp. @ 117 Volts AC (or) 255MA @ 1.5 Volts DC & 18MA @ 90 Volts DC

TUNING RANGE

Standard Broadcast	510-1620KC	Freq. Mod.	88-108MC
Short Wave	19-49Meters		

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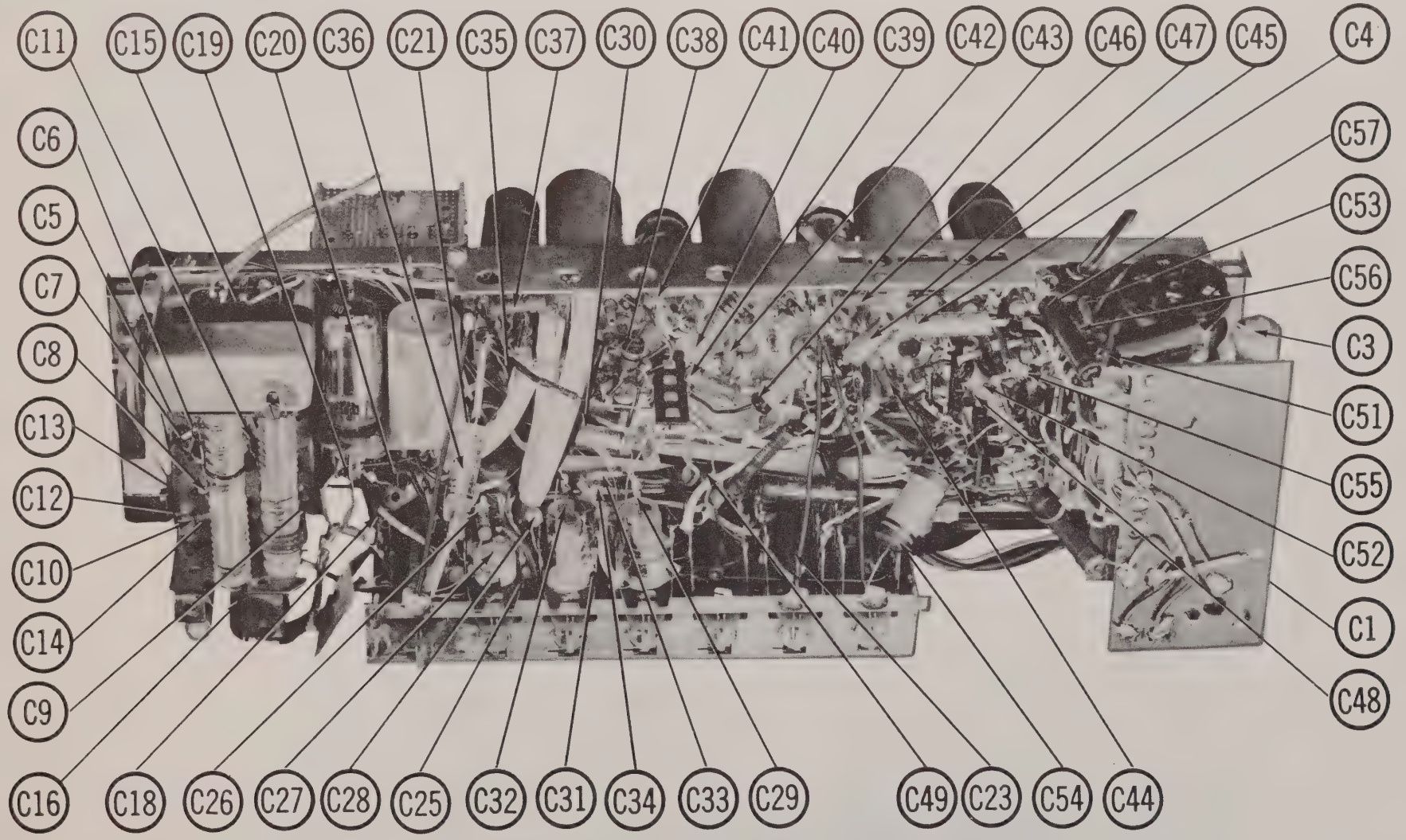
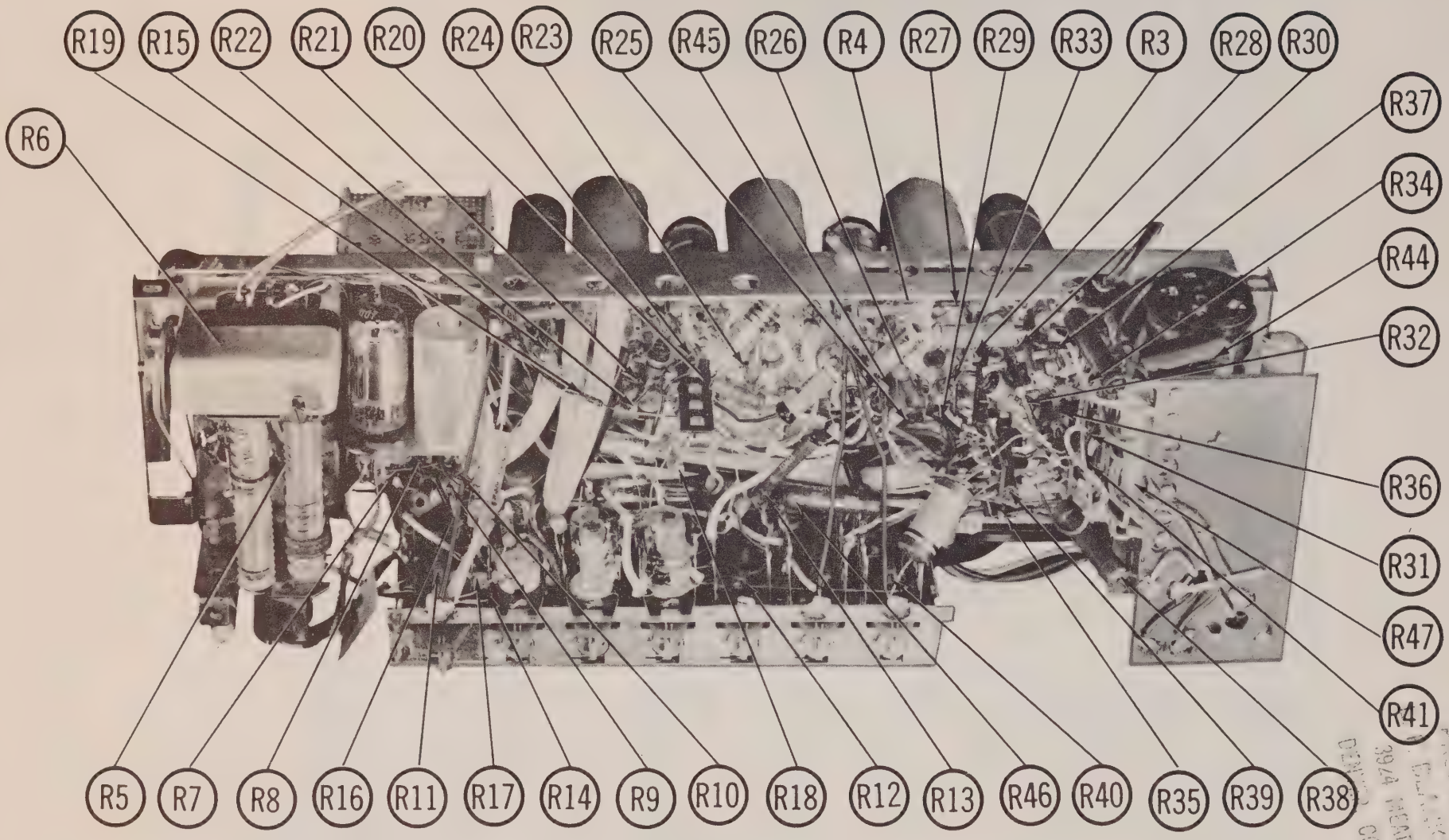


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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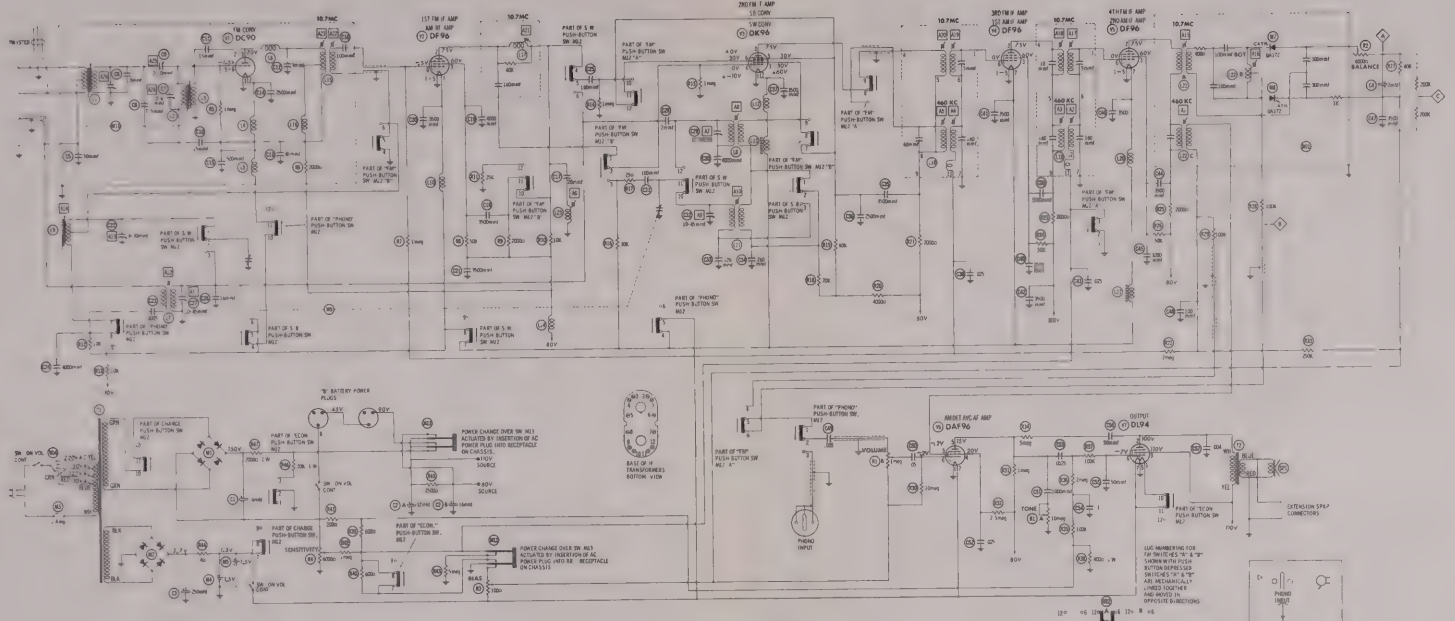
1ST CONV DC90
10.7MC
1ST FM IF AMP AM RF DF96
2ND FM IF AMP 5R CONV DK96
3RD FM IF AMP 2ND AM IF AMP DF96
4TH FM IF AMP 2ND AM IF AMP DF96
10.7MC
460 KC
"B" BATTERY POWER PLUGS
POWER CHANGE OVER SW. NO.3 ACTUATED BY INSERTION OF AC POWER PLUG INTO RECEPTACLE ON CHASSIS
+150V SOURCE
+80V SOURCE
BASE OF IF TRANSFORMERS BOTTOM VIEW
AUDIO AVC AF AMP DA96
OUTPUT DL96
PHONO INPUT
VOLUME
TONE
EXTENSION SPKR CONNECTORS
PHONO INPUT
SW ANT
FM ANT
EXT SPKR
ANT. PHONO AND EXTENSION SPKR CONNECTOR BOARD MOUNTED ON REAR OF SPKR

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	DC90	0Ω	*.6500Ω	*.6500Ω	NC	.1MEG	1MEG	0Ω
V2	DF96	0Ω	5.600Ω	*.15Ω	NC	NC	3.1MEG	0Ω
V3	DK96	0Ω	5.600Ω	1.6Ω	.1MEG	1.6Ω	1MEG	0Ω
V4	DF96	0Ω	5.600Ω	*.5Ω	NC	NC	2.2MEG	0Ω
V5	DF96	0Ω	5.600Ω	*.5Ω	NC	NC	0Ω	0Ω
V6	DA96	0Ω	NC	2Ω	1.2MEG	*.1MEG	.5Ω	.5Ω
V7	DL94	0Ω	*.2400Ω	*.2000Ω	NC	0Ω	2.2MEG	0Ω

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE NOTED
* MEASURED FROM OUTPUT OF IF.
MEASURED IN "SR"-STANDARD BROADCAST POSITION
NC NO CONNECTION

LUG NUMBERING FOR FUNCTION-CHANGE, PHONO, S. R., AND S. W. PUSHBUTTON SWITCHES SHOWN IN OUT POSITION

LUG NUMBERING FOR FM SWITCHES "A" & "B" SHOWN WITH PUSH BUTTON DEPRESSED SWITCHES "A" & "B" ARE MECHANICALLY LINKED TOGETHER AND MOVED IN OPPOSITE DIRECTIONS

343-11

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

SB & SW ALIGNMENT

With volume control turned down, adjust hum control for MINIMUM hum.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 6 (grid) of DK96 (V3). Low side to chassis.	460KC (400~ Mod)	SB	800KC	Across voice coil	A1, A2, A3, A4, A5	Adjust for maximum output.
2.	Direct	High side to antenna socket. Low side to chassis.	"	"	Tuning gang fully open.	"	A6	Adjust for MINIMUM output.
3.	.01MFD	High side to pin 6 (grid) of DK96 (V3). Low side to chassis.	15.275MC (Small mark under 19M)	SW	15.275MC	"	A7	Adjust for maximum output.
4.	"	"	7.200MC (Small mark under 41M)	"	7.200MC	"	A8	Adjust for maximum output. Repeat step 3.
5.	"	"	1450KC	SB	1450KC	"	A9	Adjust for maximum output.
6.	"	"	600KC	"	600KC	"	A10	Adjust for maximum output. Repeat step 5.
7.	100MMF and 100Ω carbon resistor in series	High side thru dummy to antenna socket. Low side to chassis.	15.275MC	SW	15.275MC	"	A11	Adjust for maximum output.
8.	"	"	7.200MC	"	7.200MC	"	A12	Adjust for maximum output. Repeat step 7.
9.	"	"	1450KC	SB	1450KC	"	A13	Adjust for maximum output.
10.	"	"	600KC	"	600KC	"	A14	Adjust for maximum output. Repeat step 9.

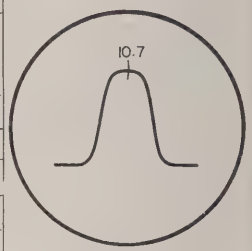


FIG. 1

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 200K (±1%) resistors in series from point Ⓐ to chassis. The junction of these two resistors is alignment point Ⓒ as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
11.	500MMF	High side to pin 6 (grid) of DF96 (V5). Low side to chassis.	10.7MC (unmod)	FM	Point of non-interference.	DC probe to point Ⓐ. Common to chassis.	A15	Adjust for maximum deflection.
12.	"	"	"	"	"	DC probe to point Ⓑ. Common to point Ⓒ.	A16	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
13.	"	High side to pin 6 (grid) of DF96 (V4). Low side to chassis.	"	"	"	DC probe to point Ⓐ. Common to chassis.	A17, A18	Adjust for maximum deflection.
14.	"	High side to pin 6 (grid) of DK96 (V3). Low side to chassis.	"	"	"	"	A19, A20	"
15.	Direct	High side to ungrounded tube shield floating on DC90 (V1). Low side to chassis.	"	"	"	"	A21	"
16.	"	"	"	"	"	"	A22, A23	"
17.	"	"	10.7MC (30% AM Mod)	"	"		R2	Adjust R2 (Balance control) for MINIMUM deflection with volume control set at maximum.
18.						"	A24	Set VTVM pointer at center of dial. Adjust A24 for MINIMUM deflection.

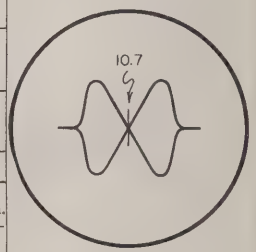


FIG. 2

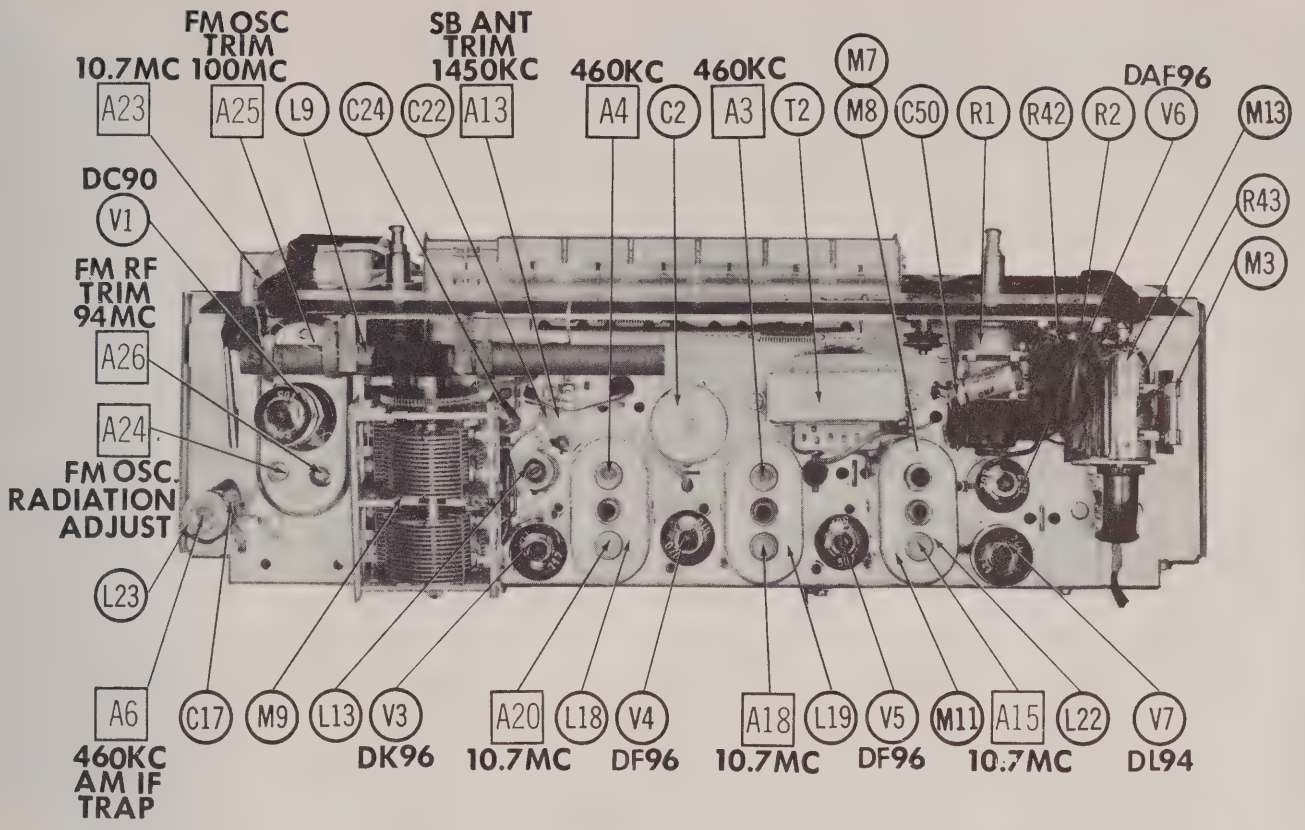
FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

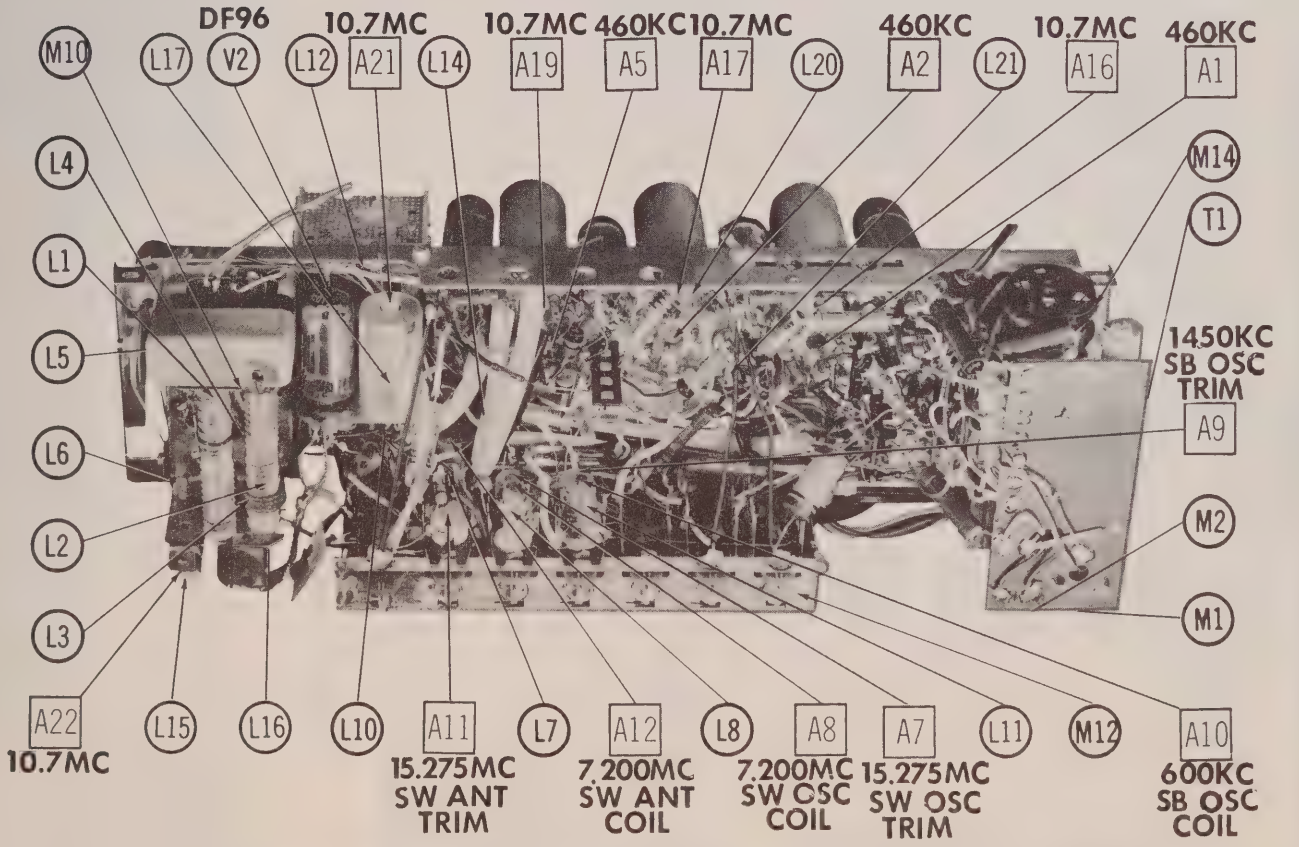
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
11.	500MMF	High side to pin 6 (grid) of DF96 (V5). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference.	Vert. amp. to point Ⓐ. Low side to chassis.	A15	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
12.	"	"	"	"	"	Vert. amp. to point Ⓑ. Low side to point Ⓒ.	A16	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A15 for maximum amplitude and straightness of crossover lines.
13.	"	High side to pin 6 (grid) of DF96 (V4). Low side to chassis.	"	"	"	Vert. amp. to point Ⓐ. Low side to chassis.	A17, A18	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
14.	"	High side to pin 6 (grid) of DK96 (V3). Low side to chassis.	"	"	"	"	A19, A20	"
15.	Direct	High side to ungrounded tube shield floating on DC90 (V1). Low side to chassis.	"	"	"	"	A21	"
16.	"	"	"	"	"	"	A22, A23	"
17.							R2	Adjust R2 (Balance control) for MINIMUM output with volume control at maximum.
18.						VTVM DC probe to point Ⓐ. Common to chassis.	A24	Set VTVM pointer at center of dial. Adjust A24 for MINIMUM deflection.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
19.	Direct	Across FM antenna terminals.	100MC	FM	100MC	DC probe to point Ⓐ. Common to chassis.	A25	Adjust for maximum deflection.
20.	"	"	94MC	"	94MC	"	A26	"



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW ALIGNMENT IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	FM Converter	DC90	
V2	1st FM IF Amplifier-SB-SW RF Amplifier	DF96	
V3	2nd FM IF Amplifier-SB-SW Mixer-Osc.	DK96	
V4	3rd FM IF Amplifier-1st SB-SW IF Amplifier	DF96	
V5	4th FM IF Amplifier-2nd SB-SW IF Amplifier	DF96	
V6	SB-SW Det-AVC-AF Amp.	DAF96	
V7	Output	DL94	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA Telefunken PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	16	275	8234070	AFH1-32	BR1635			MT-3516	
C2A	32	160	8234071	AFH2-09	BBRD3215				
B	16	160							
C3	250	12	8234072	SRE12V200			TD-250-15		TVA-1131
C4	2	70		SRE150V5	BBR2-75				

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA Telefunken PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	50									
C6	3									
C7	2-10									
C8	7.5									
C9	2-6									
C10	15									
C11	15									
C12	3									
C13	45									
C14	2500			SI2500	D6-252	TP58	GP2-333-252	UC-5225	5GA-D25	
C15	500									
C16	100									
C17	20			NP0-SI20	TCZ-20	TZ13	NP0K-200	ZT-542	5TCC-Q2	
C18	3500			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C19	4000			SI4000	D6-402	TP62	GP2-333-402	UC-5240	5GA-D4	
C20	3500			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C21	3500			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C22	6-30									
C23	.0005	500		SI500	D6-501	CUB6T5	GP2K-501	PT635	6TM-T5	
C24	4000			SI4000	D6-402	TP62	GP2-333-402	UC-5240	5GA-D4	
C25	160									
C26	16									

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA Telefunken PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C27	10-45					Z005				
C28	2									
C29	2-10									
C30	4000			SI4000	D6-402	TP62	GP2-333-402	UC-5240	5GA-D4	
C31	100			NP0-SI100	TCZ-100	TZ30	NP0-337-101	ZT-531	5TCC-T1	
C32	10-45									
C33	126									
C34	260									
C35	3500			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C36	2500			SI2500	D6-252	TP58	GP2-333-252	UC-5225	5GA-D25	
C37	3500			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C38	.025	125		P288N-025	DF-203	CUB4S22	817-02	PT4122	2TM-S22	
C39	3500			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C40	2500			SI2500	D6-252	TP58	GP2-333-252	UC-5225	5GA-D25	
C41	3500			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C42	3500			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C43	.025	125		P288N-025	DF-203	CUB4S22	817-02	PT4122	2TM-S22	
C44	3500			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C45	3200			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C46	3500			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C47	3500			SI3300	D6-332	TP61	GP2-333-332	UC-5233	5GA-D33	
C48	100			SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C49	.005	250		BPD-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C50	.05	125		BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C51	1000			SI1000	D6-102	TP52	GP2L-102	UC-521	5GA-D1	
C52	.025	125		P288N-025	DF-203	CUB4S22	817-02	PT4122	2TM-S22	
C53	.0025	500		SI2500	D6-252	TP58	GP2-333-252	UC-5225	5GA-D25	
C54	.1	125		P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C55	50			SI50	D6-500	TP30	GP1K-500	UC-545	5GA-Q5	
C56	50			SI50	D6-500	TP30	GP1K-500	UC-545	5GA-Q5	
C57	.004	500		SI4000	D6-402	CUB6D4	GP2-333-402	PT624	6TM-D4	

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Telefunken PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	10Meg	½	8254110					Tone (Panel)
B	1Meg	½	Not Req.					Volume & Switch (Rear)
R2	6000Ω	½	8245177					Balance
R3	100Ω	½	8245175					Bias
R4	6000Ω	½	8245177					Sensitivity

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Telefunken PART No.	IRC PART No.	
R5	1Meg			BTS-1Meg	
R6	2000Ω			BTS-2000	
R7	1Meg			BTS-1Meg	
R8	50K			BTS-51K 5%	
R9	2000Ω			BTS-2200	
R10	10K			BTS-10K	
R11	25K				
R12	10K			BTS-10K	
R13	10K			BTS-10K	
R14	1Meg			BTS-1Meg	
R15	1Meg			BTS-1Meg	
R16	30K			BTS-30K 5%	
R17	25Ω			BTS-24Ω 5%	
R18	20K			BTS-22K	
R19	60K				
R20	4000Ω				
R21	2000Ω			BTS-2200	
R22	2Meg			BTS-2. 2Meg	
R23	2000Ω			BTS-2200	
R24	50K			BTS-51K 5%	
R25	2000Ω			BTS-2200	
R26	50K			BTS-51K 5%	
R27	40K				
R28	100K			BTS-100K	
R29	100K			BTS-100K	
R30	10Meg			BTS-10Meg	
R31	1Meg			BTS-1Meg	
R32	2. 5Meg			BTS-2.4Meg 5%	
R33	250K				
R34	5Meg			BTS-5. 1Meg 5%	
R35	100K			BTS-100K	
R36	2Meg			BTS-2. 2Meg	
R37	100K			BTS-100K	
R38	400Ω	1			
R39	600Ω				
R40	600Ω				
R41	200Ω			BTS-220	
R42	1Meg			BTS-1Meg	
R43	5Meg			BTS-5. 1Meg 5%	
R44	4Ω			BW½-3. 9Ω	
R45	2500Ω			BTS-2400 5%	
R46	20K	1		BTA-22K	
R47	2000Ω	1		BTA-2200	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	Telefunken PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .11A	150VAC @ .022A	4VAC @ .25A		9036980					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Telefunken PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	8. 8K	3-4Ω	9036981	Z1004	A-2903	A-3856	24S49	S-51X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Telefunken PART No.	QUAM PART No.	RCA TYPE No.	
SP1	4" X 6"	PM	3-4Ω	8213532			

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Telefunken PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	FM RF Coil	0ΩCT	0Ω					
L2	FM Osc. Coil	0Ω						
L3	IF Trap	0Ω						
L4	Fil. Choke	. 7Ω						
L5	Fil. Choke							
L6	RF Choke							
L7	SW Ant. Coil	. 5Ω	. 5Ω	9036978				
L8	SW. Osc. Coil	. 5Ω	. 5Ω	9036978				
L9	BC Ant. Coil	. 9ΩCT		9045351				
L10	Fil. Choke							
L11	BC Osc. Coil	. 4Ω	2. 2Ω	9036982				
L12	Fil. Choke	. 7Ω						
L13	Fil. Choke	. 8Ω		9036984				
L14	RF Choke	15Ω						
L15	1st FM IF	1. 6Ω	1. 1Ω*					*Tapped
L16	RF Choke	14Ω						
L17	2nd FM IF							

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Telefunken PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L18A	3rd FM IF	1. 4Ω	1. 7Ω	9044914				Tertiary winding = . 1Ω
B	1st BC IF	6. 8Ω	5. 8Ω					
L19A	4th FM IF	1. 3Ω	1. 6Ω	9044915				Tertiary winding = . 1Ω
B	2nd BC IF	6. 7Ω	5. 8Ω					
L20	Fil. Choke	. 7Ω						
L21	Fil. Choke	. 8Ω		9036984				
L22A	Ratio Det. Trans.	1. 8Ω	. 1Ω					
B	Ratio Det. Coil	. 2ΩCT						
C	3rd BC IF	5. 8Ω	8. 5Ω					
L23	IF Trap	39Ω		9036976				

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	Telefunken PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	. 022A	8246075		8RS050				
M2	. 25A	8246076		Q1H				

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA						NOTES
			Telefunken PART No.		LITTELFUSE PART No.		BUSS PART No.		
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER	
M3		. 1A	8248279						

BATTERIES

ITEM No.	VOLTAGE	Telefunken PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M4	1. 5V "A" (Nickel-cadmium storage battery)	8217006							
M5	1. 5V "A"		950			2R			Connect 2 in parallel.
M6	90V "B"			482			M30		Connect 2 in series.

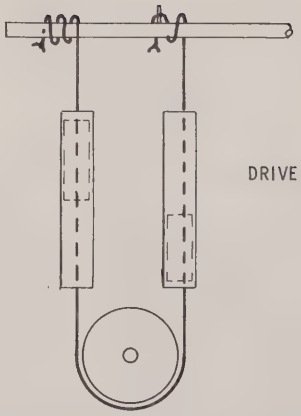
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		Telefunken PART No.	SYLVANIA PART No.	
M7	OA172	8244004	1N34A	Ratio Det. (Pigtail)
M8	OA172	8244004	1N34A	Ratio Det. (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	Telefunken PART No.	NOTES
M9	Tuning Cap.	8236017	AM (2 Gang: 11-510MMF, 11-445MMF)
M10	FM Converter Tuning Unit	9049225	Less V1. Includes Coils, Capacitors and Resistors.
M11	FM Detector & AM Filter Assy.	9044913	Includes M7, M8, Coils, Capacitors and Resistors.
M12	Switch	9045358	Selector, Pushbutton Assy. (Slide Type). Includes L7, L8, L11, C27, C29 and C32.
M13	Switch	8216083	Power Changeover.
M14	Switch		Voltage Tap Selector (Power Transformer T1). Part of T1.

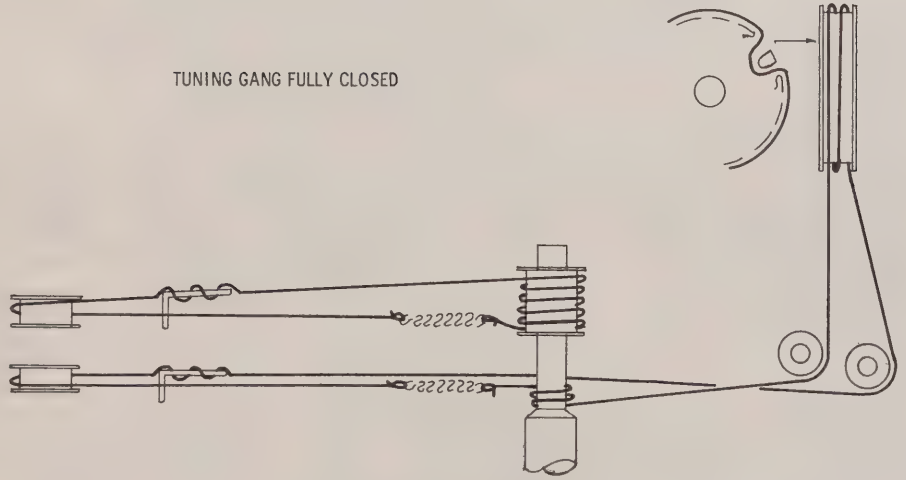
TUNING CORES SET TO LOWEST FREQUENCY SETTING.



DRIVE CORD FOR FM TUNING CORES

LENGTH OF CORD MEASURED FROM CORE TO CORE OVER PULLEY – 3 2/5"

TUNING GANG FULLY CLOSED



DIAL CORD STRINGING

TRAV-LER MODEL 6300

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TRAV-LER
MODEL 6300

TRAV-LER
MODEL 6300

TRADE NAME	Trav-Ler Model 6300
MANUFACTURER	Trav-Ler Radio & Tel. Corp., 571 W. Jackson Blvd., Chicago, Ill.
TYPE SET	Battery Operated Portable AM Receiver
TUBES (Four)	Types 1R5 Converter, 1U4 IF Amplifier, 1U5 Det-AVC-AF Amp., 3Q4 Output

POWER SUPPLY 1.5 Volts "A" Supply @ 67.5Volts "B" Supply RATING 230MA @ 1.5Volts DC & 7MA @ 67.5Volts DC
TUNING RANGE—BROADCAST 535KC - 1630KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to antenna lug on tuning gang. Low side to chassis.	455KC (400~ Mod)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Adjust for maximum output.
2.	"	"	1630KC	"	"	A4	"
3.		Loop	1400KC	Tune to 1400KC signal.	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
4.		"	535KC	Tuning gang fully closed.	"	A6	"

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PARTS LIST AND DESCRIPTIONS

TRAV-LER MODEL 6300

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	1R5	
V2	IF Amplifier	1U4	
V3	Det-AVC-AF Amp.	1U5	
V4	Output	3Q4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Trav-Ler PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	10	75	EC-11	SRE70V10	BBR10-90	TC-42	TD-10-150	FM-1508	TVA-1406

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	100		CC-5	NP0-S1100	D6-101	TZ30	801-101	ZT-531	5TCC-T1	
C3	5000		CC-3	BPD-005	DD-502	K080	811-005	DC525	5HK-D5	
C4	1500		CC-20	S11500	D6-152	TP54	GP2L-152	UC-5215	5GA-D15	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Trav-Ler PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	VC-40	B-70-S	A47-1Meg-Z	Q13-137	U53	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	Not Req.	SWE-20	76-2	US-27	Attach to R1A

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

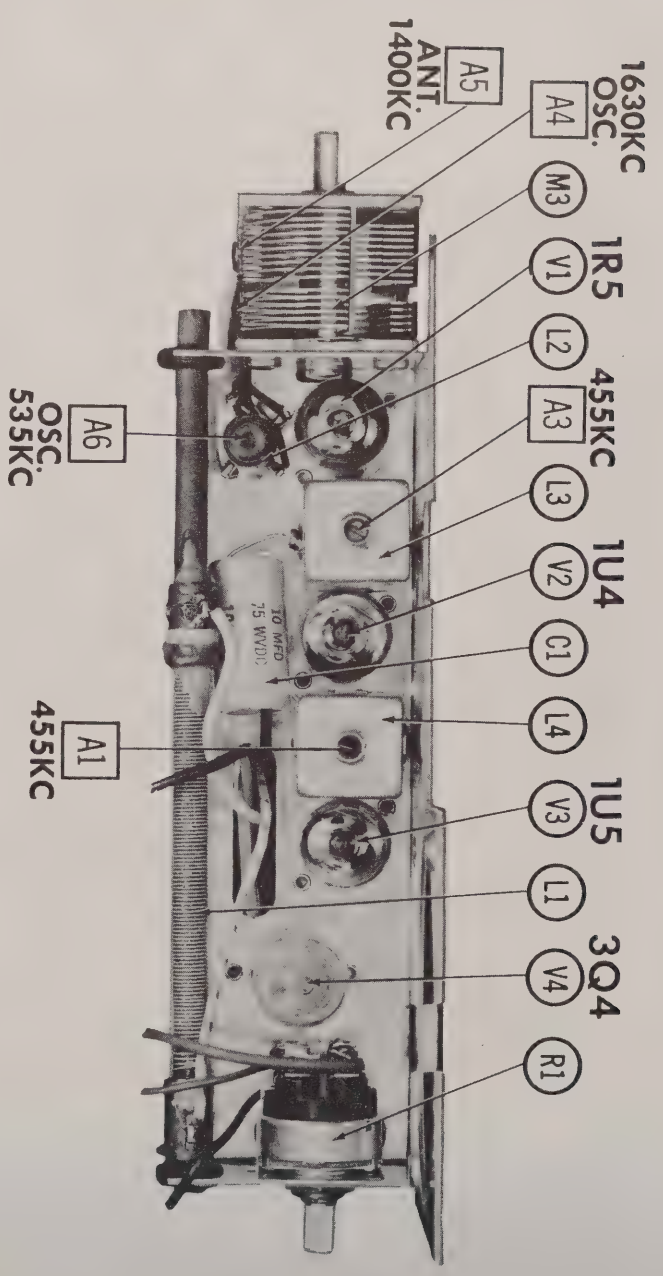
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Trav-Ler PART No.	IRC PART No.	
R2	220K		IR-20	BTS-220K	
R3	3.3Meg		IR-23	BTS-3.3Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Trav-Ler PART No.	IRC PART No.	
R4	620Ω 5%		IR-39	BTS-620 5%	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Trav-Ler PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	9800Ω	3-4Ω	Part of speaker SPK-21			A-3329		S-11X	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Trav-Ler PART No.	QUAM PART No.	RCA TYPE No.	
SP1	3"	PM	3-4Ω	SPK-21		216S1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Trav-Ler PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Stick	2.1Ω		LL-30				
L2	Osc. Coil	1.3Ω	8.8Ω	LO-18			71-Osc.	
L3	Input IF	30Ω	30Ω	L1-10	16-6780		13-PC1	
L4	Output IF	38Ω	38Ω	L1-11				

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Trav-Ler PART No.	REPLACEMENT DATA	
K1	Pentode Detector Couplate	2000MMF, 10000MMF, 150MMF, 150MMF, 5000MMF, 4.7Meg, 3.3Meg, 1Meg, 10Meg.		Aerovox Centralab Cornell-Dubilier Erie Sprague	PA521 PC-165 DP-1

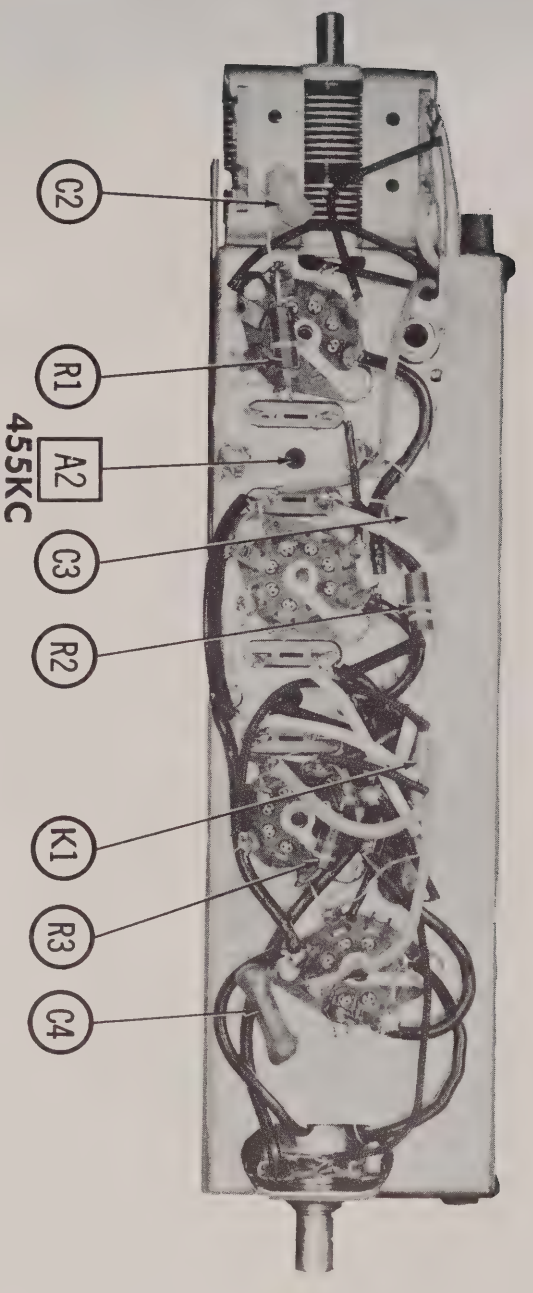
BATTERIES

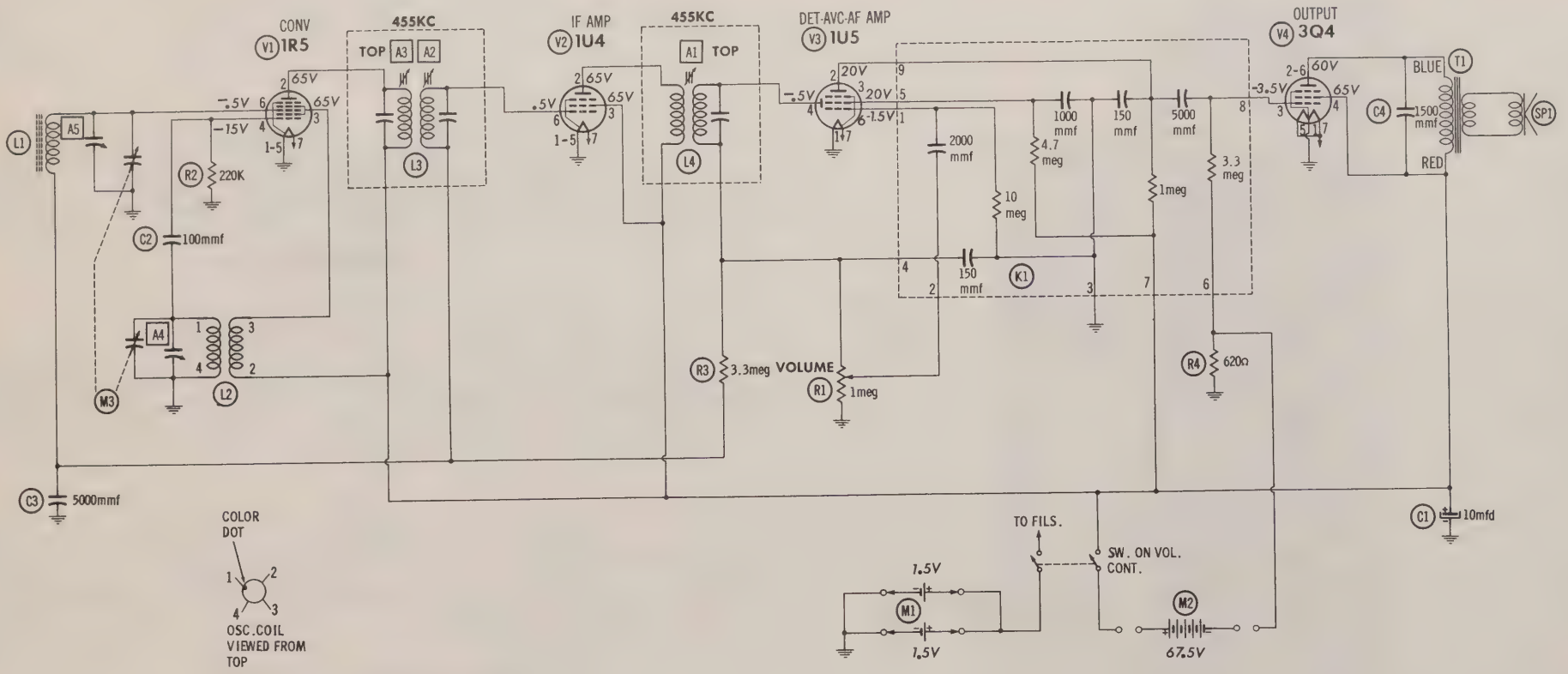
ITEM No.	VOLTAGE	Trav-Ler PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M1 M2	1.5V "A" 67.5V "B"		964	477		2IR	P45		Connect 2 in parallel

MISCELLANEOUS

ITEM No.	PART NAME	Trav-Ler PART No.	NOTES
M3	Tuning Cap.	GC-12	2 Gang (13-240MMF;13-110MMF)
	Cabinet	CA-140	
	Knob	K-130	On-Off-Volume
	Knob	K-131	Tuning

CHASSIS—BOTTOM VIEW





RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	1R5	•	†30Ω	†1.3Ω	220K	•	4.3Meg	•
V2	1U4	•	†38Ω	†0Ω	NC	•	4.3Meg	•
V3	1U5	•	†1Meg	†4.7Meg	1Meg	TP	10Meg	•
V4	3Q4	•	†400Ω	3.3Meg	†0Ω	•	†400Ω	•

• DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.
† MEASURED FROM POSITIVE SIDE OF C1.
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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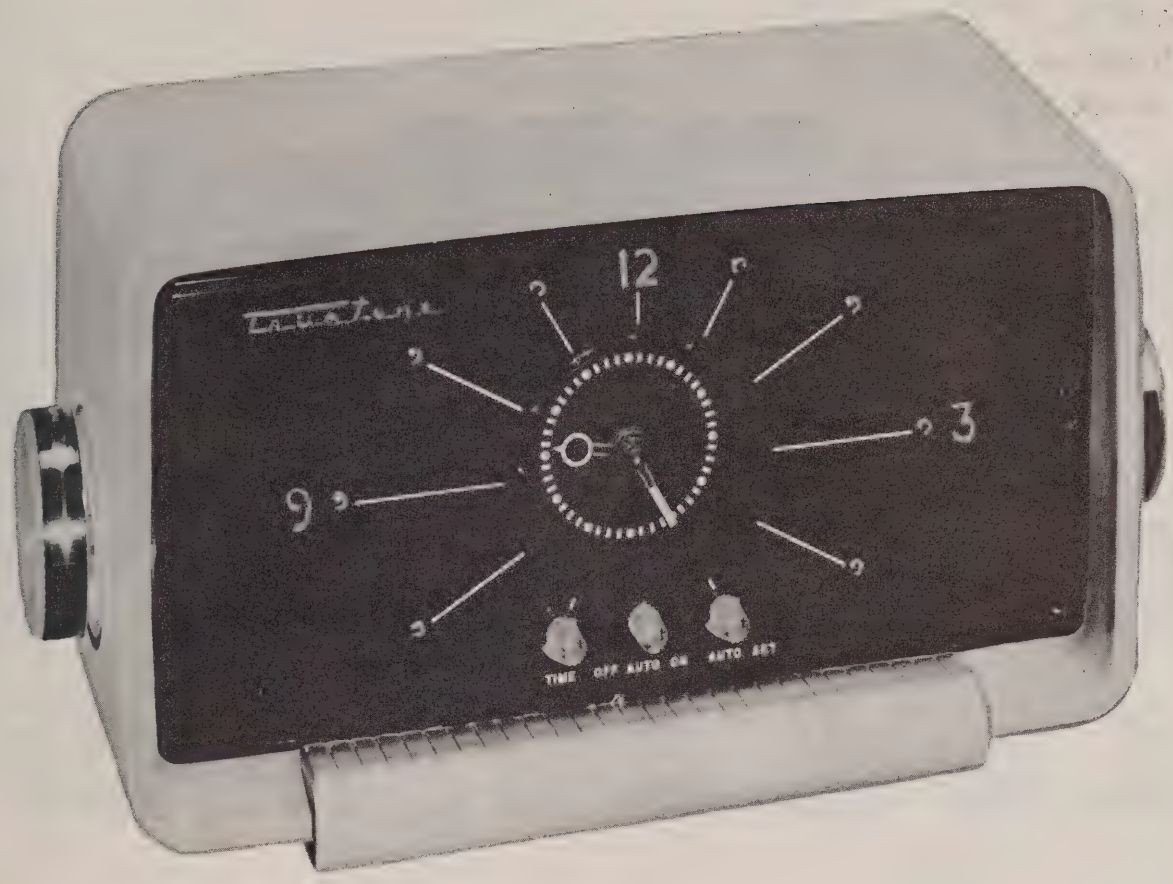
TRUETONE MODELS
D2684A, D2685A



TRUETONE MODELS
D2684A, D2685A

TRADE NAME	Truetone Models D2684A, D2685A
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	AC Operated AM Receiver With Electric Clock
TUBES (Five)	Types 12BE6 Converter, 12BA6 IF Amplifier, 12AT6 Det-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC - 60 Cycles — RATING .29 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC - 1650KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to antenna stator lug on tuning gang. Low side to B-.	455KC (400~ Mod)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1650KC	"	"	A5	"
3.		Loop	1500KC	1500KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

TRUETONE MODEL D2684A

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	12BE6	
V2	IF Amplifier	12BA6	
V3	Det-AVC-AF Amp.	12AT6	

ITEM No.	USE	TYPE	NOTES
V4	Output	50C5	
V5	Rectifier	35W4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	50	150	150-124	PRS150V3050	BBRD5315	TCD497	TDLD-8	FMD-301	TVA-2450
B	40	150	(Note 1)						

Note 1: In some versions C1B is 30MFD.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	300	500		SI300	D6-301	TP42	GP2K-301	UC-533	5GA-T3	Note 2
C3	.05	200	152-104	BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C4	300	500		SI300	D6-301	TP42	GP2K-301	UC-533	5GA-T3	Note 2
C5	.0022	400	152-101	SI2200	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C6	10000		158-102	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C7	.05	400	152-111	BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C8	.1	400		P488N-1	DF-104	CUB4P1		PT401	4TM-P1	

Note 2: Some versions may use 270MMF in this application. (part no. 156-101).

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	TRUETONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	120-123	B-60	A47-500K-S	Q13-133	U48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A

RESISTORS

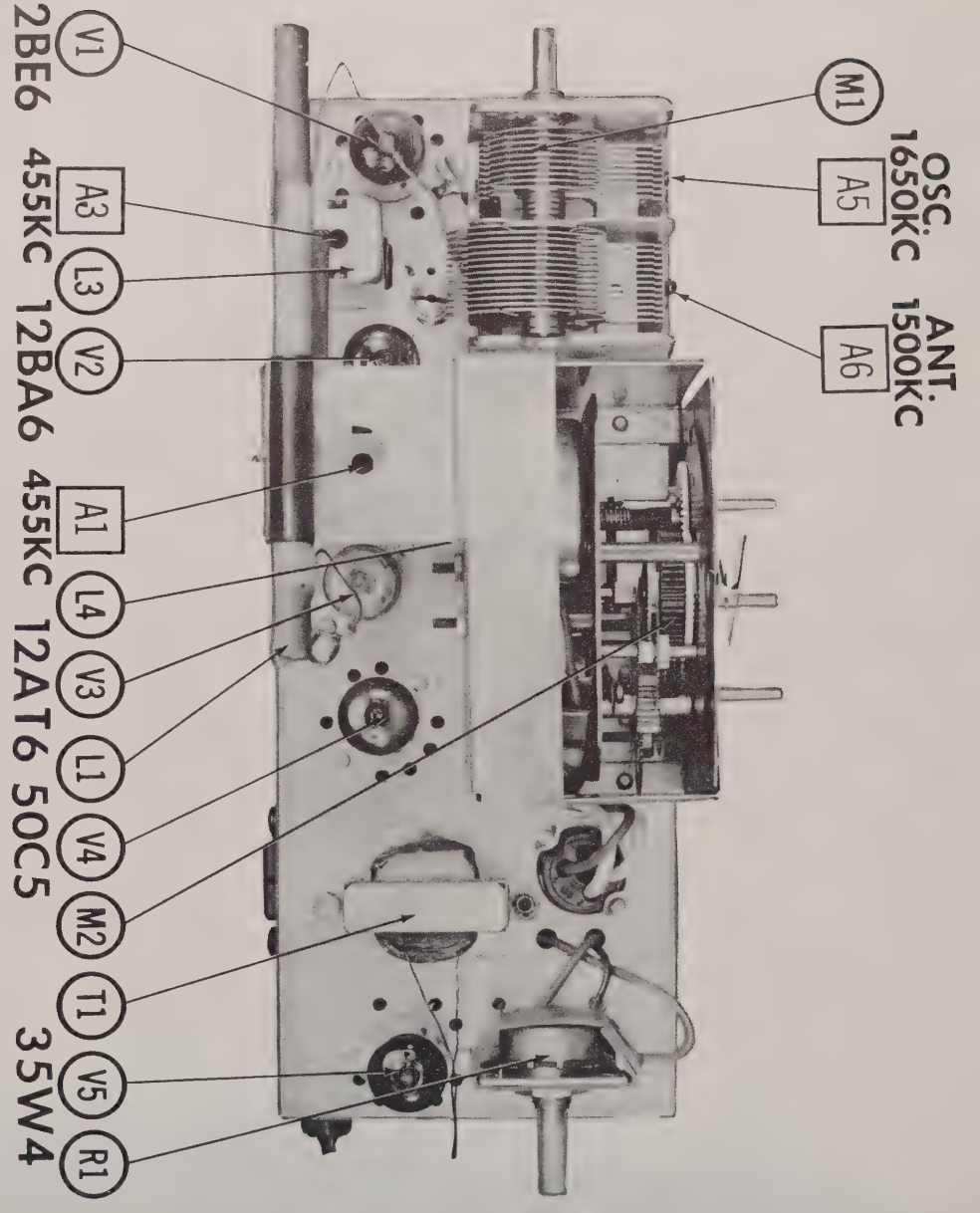
All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	TRUETONE PART No.	IRC PART No.	
R2	22K		180-12W	BTS-22K	
R3	2.2Meg		180-107	BTS-2.2Meg	
R4	270Ω			BTS-270	Note 1
R5	2.2Meg		180-107	BTS-2.2Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	TRUETONE PART No.	IRC PART No.	
R6	6.8Meg		180-135	BTS-6.8Meg	
R7	150Ω		180-111	BTS-150	
R8	1500Ω	1	180-157	BTA-1500	

Note 1: Some versions use 220Ω in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	TRUETONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2900Ω	3.5Ω	138-110	Z1103 ①	A-3031 ①	A-3336 ①	24S50A ①	S-16X ①	① Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	TRUETONE PART No.	QUAM PART No.	RCA TYPE No.	
SP1	4"	PM	3.5Ω	175-115B	4A07	223S1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Stick	.4Ω		132-127				
L2	Osc. Coil	.6Ω	6.7Ω	136-106			69-Osc.	
L3	Input IF	16Ω	16Ω	130-114	16-6758	BC-352	12-C1	
L4	Output IF	16Ω	16Ω	130-114	16-6758	BC-353	12-C2	

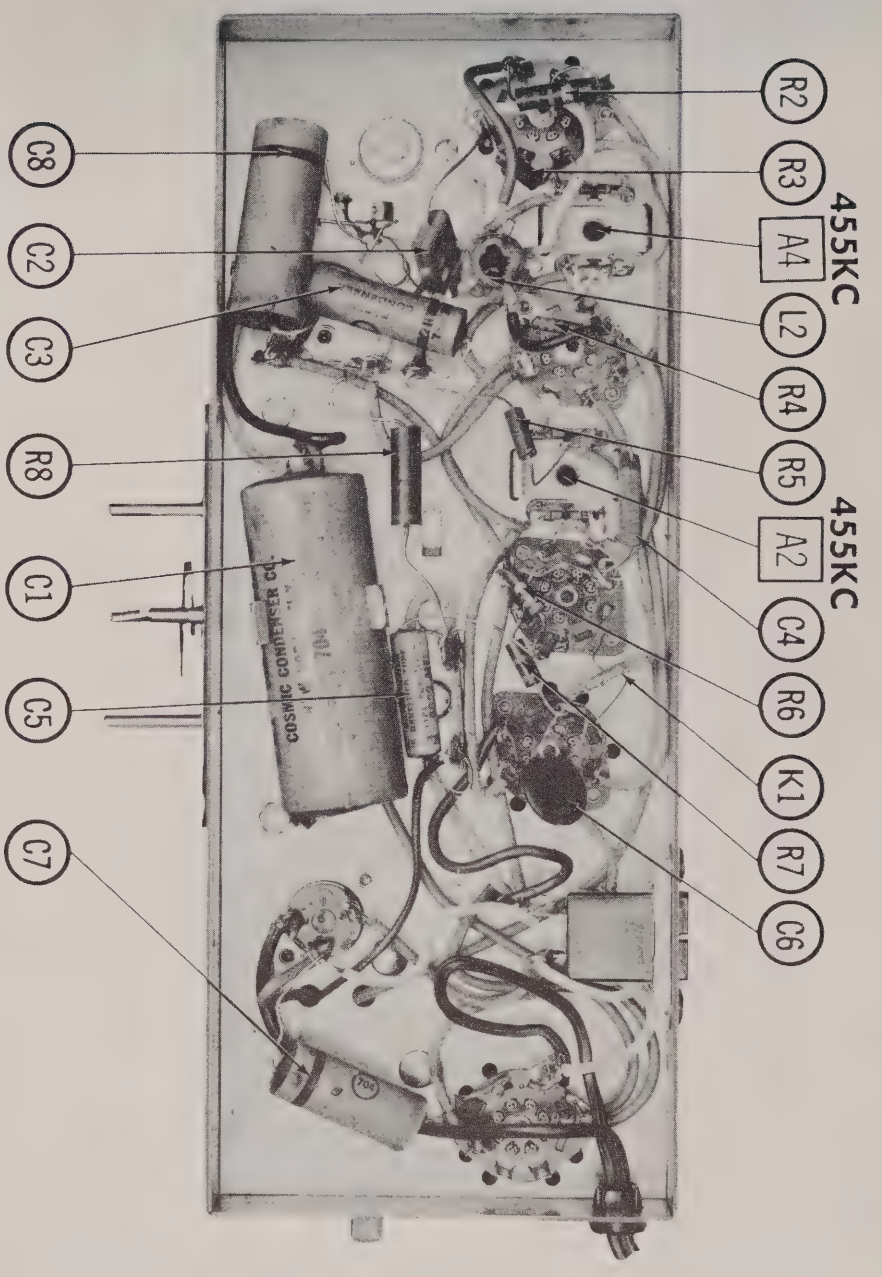
COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	TRUETONE PART No.	REPLACEMENT DATA	
K1	Audio Couplate	5000MMF, 250MMF, 250K, 470K	166-109	Aerovox Centralab Cornell-Dubilier Erie Sprague	PA112-2 PC71 112TM2 1406-02 T-4

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M1	Tuning Cap.	160-110	2 Gang (36-492MMF, 38-200MMF)
M2	Clock	207-109	
	Cabinet	210-115	Specify Color
	Knob	220-124	Volume & Tuning
	Knob	207-110	3 Used (Clock)
	Strip Insert	215-129	Tuning Control
	Strip Insert	215-124	Volume Control

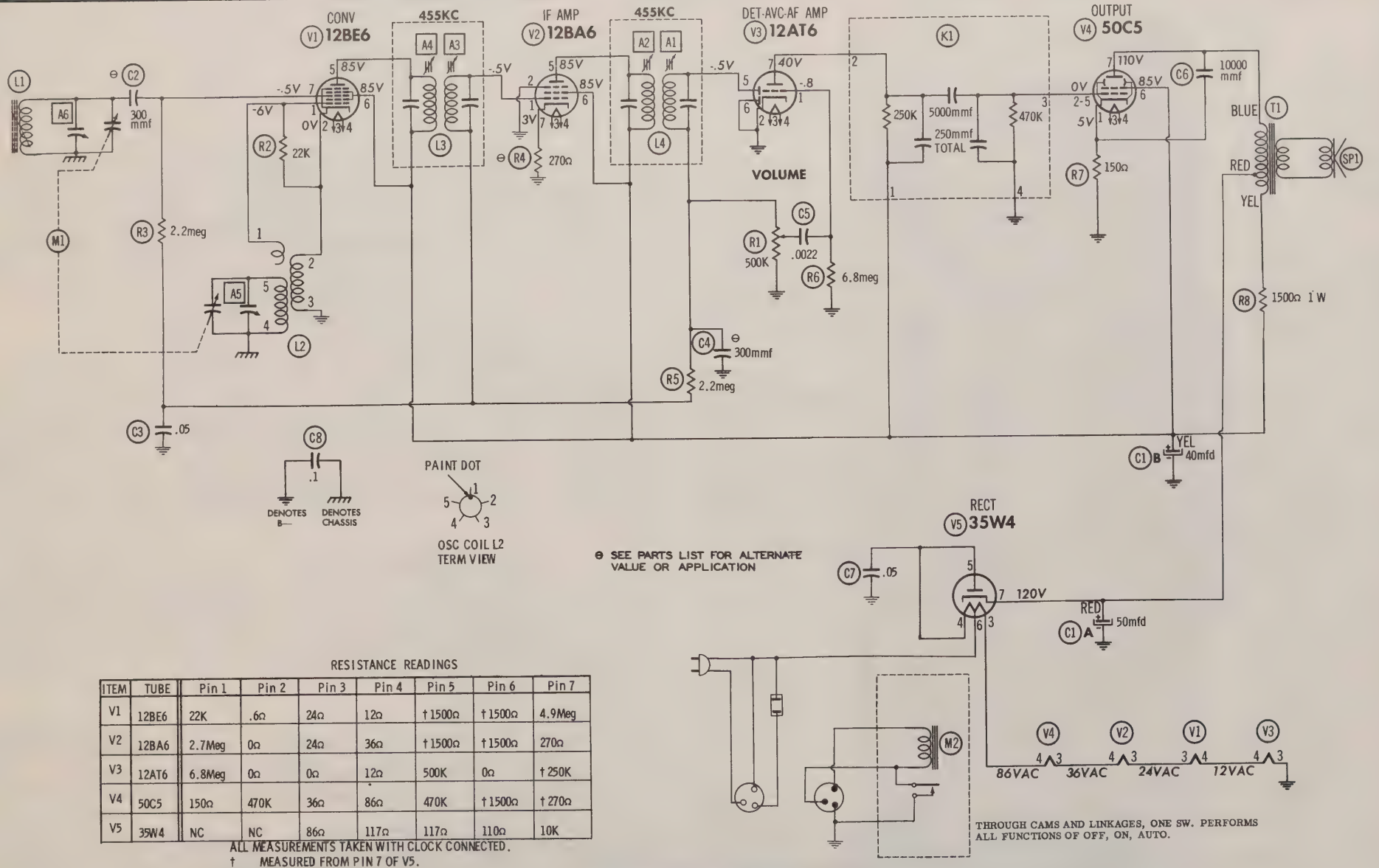
CHASSIS—BOTTOM VIEW



SET 343 FOLDER 13

TRUETONE MODEL D2684A

TRUETONE MODEL D2684A



⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

THROUGH CAMS AND LINKAGES, ONE SW. PERFORMS ALL FUNCTIONS OF OFF, ON, AUTO.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	22K	.6Ω	24Ω	12Ω	†1500Ω	†1500Ω	4.9Meg
V2	12BA6	2.7Meg	0Ω	24Ω	36Ω	†1500Ω	†1500Ω	270Ω
V3	12AT6	6.8Meg	0Ω	0Ω	12Ω	500K	0Ω	†250K
V4	50C5	150Ω	470K	36Ω	86Ω	470K	†1500Ω	†270Ω
V5	35W4	NC	NC	86Ω	117Ω	117Ω	110Ω	10K

ALL MEASUREMENTS TAKEN WITH CLOCK CONNECTED.
† MEASURED FROM PIN 7 OF V5.
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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TRUETONE MODEL D3614A

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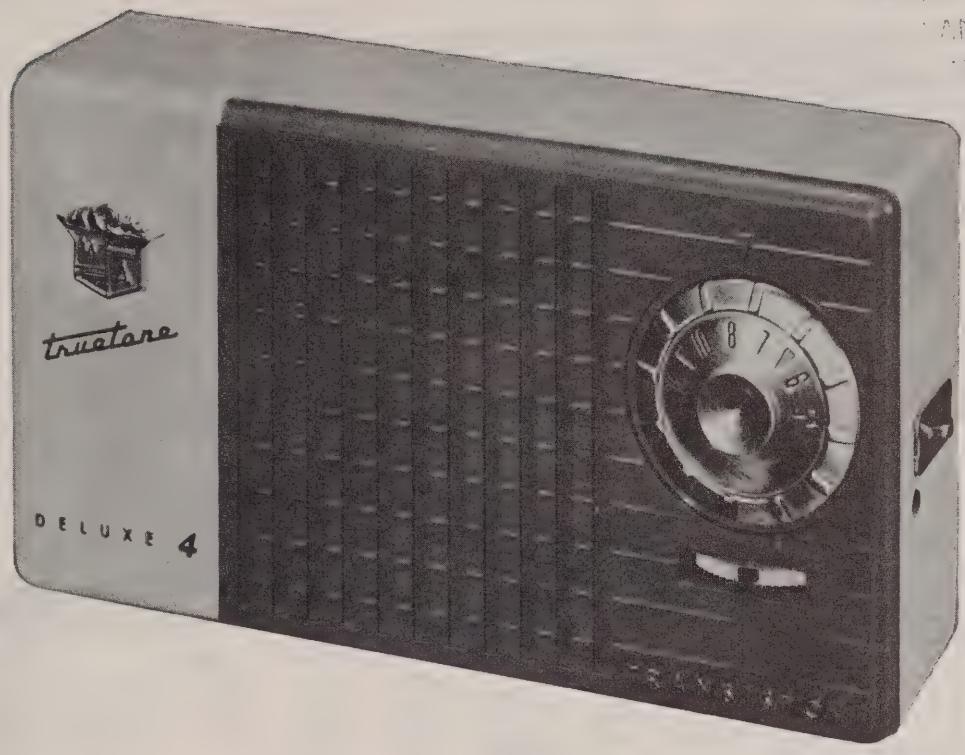
TRUETONE MODEL D3614A



TRUETONE MODEL D3614A

TRADE NAME	Truetone Model D3614A
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	Battery Operated Portable Transistorized AM Receiver
POWER SUPPLY	9 Volt Battery — RATING 14MA @ 9 Volts DC
TUNING RANGE—BROADCAST	535KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.5MFD	High side to base of CK-760 (X1). Low side to chassis.	455KC (400~ Mod)	Tuning gang fully open.	Across voice coil.	A1, A2	Adjust for maximum output.
2.	"	"	1620KC	"	"	A3	"
3.	"	"	535KC	Tuning gang fully closed.	"	A4	"
4.	"	"	1620KC	Tuning gang fully open.	"	A3	Retouch for maximum output.
5.		Loop	1400KC	Tune to 1400KC signal.	"	A5	Adjust for maximum output while rocking tuning gang.

DISASSEMBLY INSTRUCTIONS

1. Remove battery.
2. Remove screw in center of tuning knob. Remove knob.
3. Remove screw behind tuning knob. Remove case cover.
4. Remove 3 screws holding chassis.
5. Carefully remove chassis from case.

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PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	USE	TYPE	NOTES
X1	Converter	CK-760	Note 1
X2	IF Amplifier	CK-760	Note 1
X3	AF Amplifier	2N132	
X4	Output	2N138	

Note 1. Type 2N112 may be used in some models.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	50	10	8C-26454	XPP10V50	EC50-10				R2279*
C2	6	3	8C-26455	XPP3V6	EC6-3		ML-6-3		R2280*
C3	6	3	8C-26455	XPP3V6	EC6-3		ML-6-3		R2280*
C4	50	3	8C-26453	XPP3V50	XPP50-3		ML-50-3		TE-1100
C5	6	3	8C-26455	XPP3V6	EC6-3		ML-6-3		R2280*

*Non catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C6	10000		8G-26457	BPD-01	DD-103	K082	ED-01	DC511	5HK-S1	
C7	10000		8G-26457	BPD-01	DD-103	K082	ED-01	DC511	5HK-S1	
C8	350		8N1-274	1469-00035		5R5T35			MS-335	
C9	50000		8G-26459							
C10	50000		8G-26459							
C11	15		8G-26706							Note 1
C12	50000		8G-26459							
C13	10000		8G-26457	BPD-01	DD-103	K082	ED-01	DC511	5HK-S1	
C14	10000		8G-26457	BPD-01	DD-103	K082	ED-01	DC511	5HK-S1	

Note 1: Some versions may use 10MMF in this application. (Part #8L-26471).

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA TRUETONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	10K	½	10A-26383					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

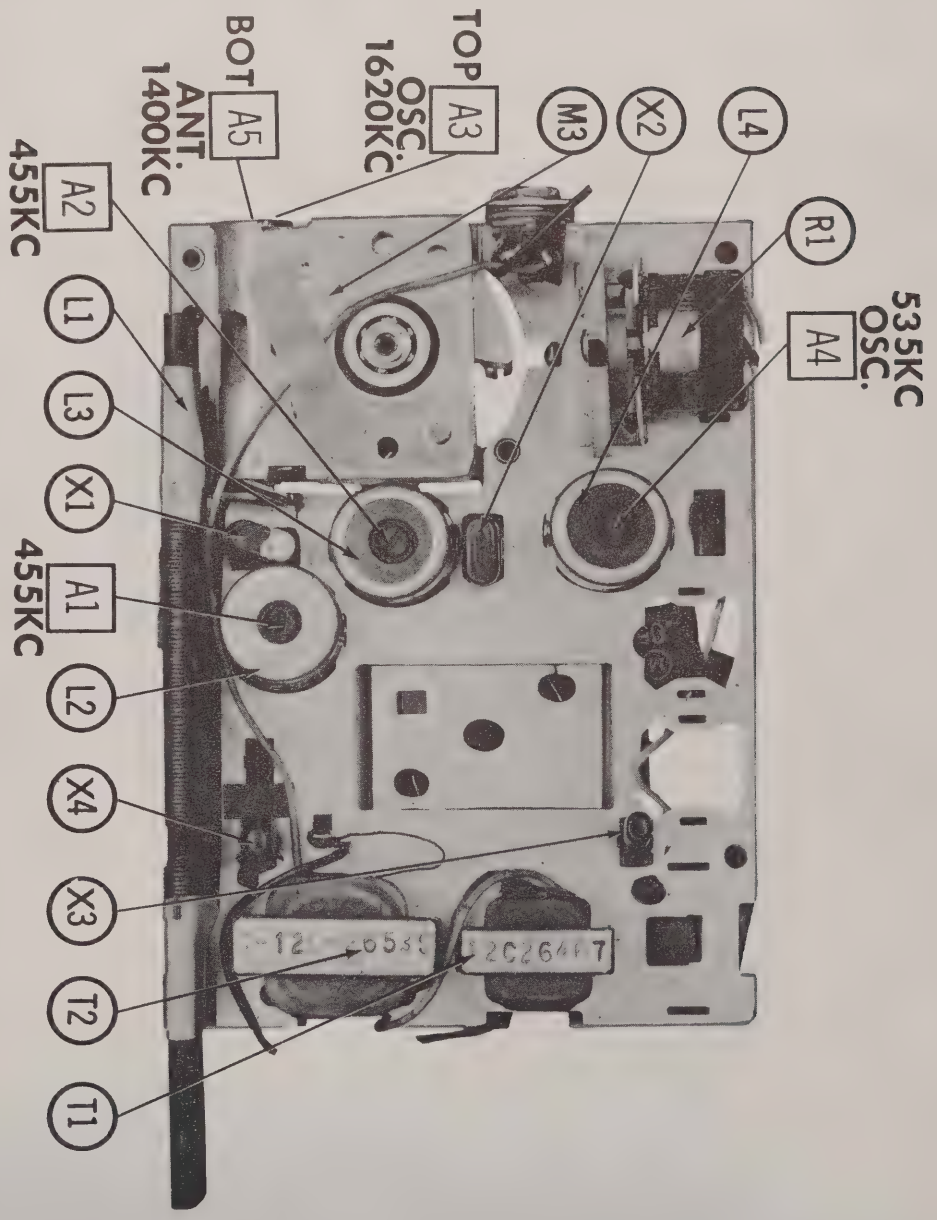
ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	NOTES
R2	33K		9B5-80	BTR-33K	
R3	18K		9B5-77	BTR-18K	
R4	1000Ω		9B5-62	BTR-1000	
R5	5100Ω 5%		9B5-176	BTS-5100 5%	
R6	1000Ω		9B5-62	BTR-1000	
R7	1000Ω		9B5-62	BTR-1000	
R8	1000Ω		9B5-62	BTR-1000	
R9	10K		9B5-74	BTR-10K	
R10	150K		9B5-88	BTR-150K	
R11	5100Ω 5%		9B5-176	BTR-5100 5%	Note 1
R12	27K		9B5-79	BTR-27K	Note 2
R13	1000Ω		9B5-62	BTR-1000	
R14	4300Ω 5%		9B5-174	BTR-4300 5%	
R15	560Ω 5%		9B5-59	BTR-560 5%	
R16	82Ω			BTR-82	
R17	470Ω		9B5-58	BTR-470	Note 3

Note 1: Early production models use 1000Ω in this application. (Part #9B5-62).
Note 2: Early production models use 6800Ω in this application. (Part #9B5-179).
Note 3: Early production models use 200Ω 5% in this application. (Part #9B1-142).

TRANSFORMER (INPUT)

ITEM No.	RESISTANCE PRI.	RESISTANCE SEC.	REPLACEMENT DATA TRUETONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	880Ω	120Ω	12M-26467				TR-13		
	Turns Ratio 4 : 1								

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	TRUETONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	1900Ω	19Ω	12C-26539						

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	TRUETONE PART No.	QUAM PART No.	RCA TYPE No.	
SP1	2 3/4"	PM	19Ω	18A-26389		222S1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Stick	.1Ω	2.2Ω	13E-26452				
L2	Osc. Coil	.6Ω	4Ω*	13D-26379				*Tap ⓐ .3Ω
L3	1st IF Trans.	1.3Ω■	.5Ω	13A-26380				■Tap ⓐ .5Ω
L4	2nd IF Trans.	1.4Ω▲	1.9Ω	13B-26382				▲Tap ⓐ .5Ω

BATTERIES

ITEM No.	VOLTAGE	TRUETONE PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M1	9V	3B-6465		216			2U6		

CRYSTAL DIODE

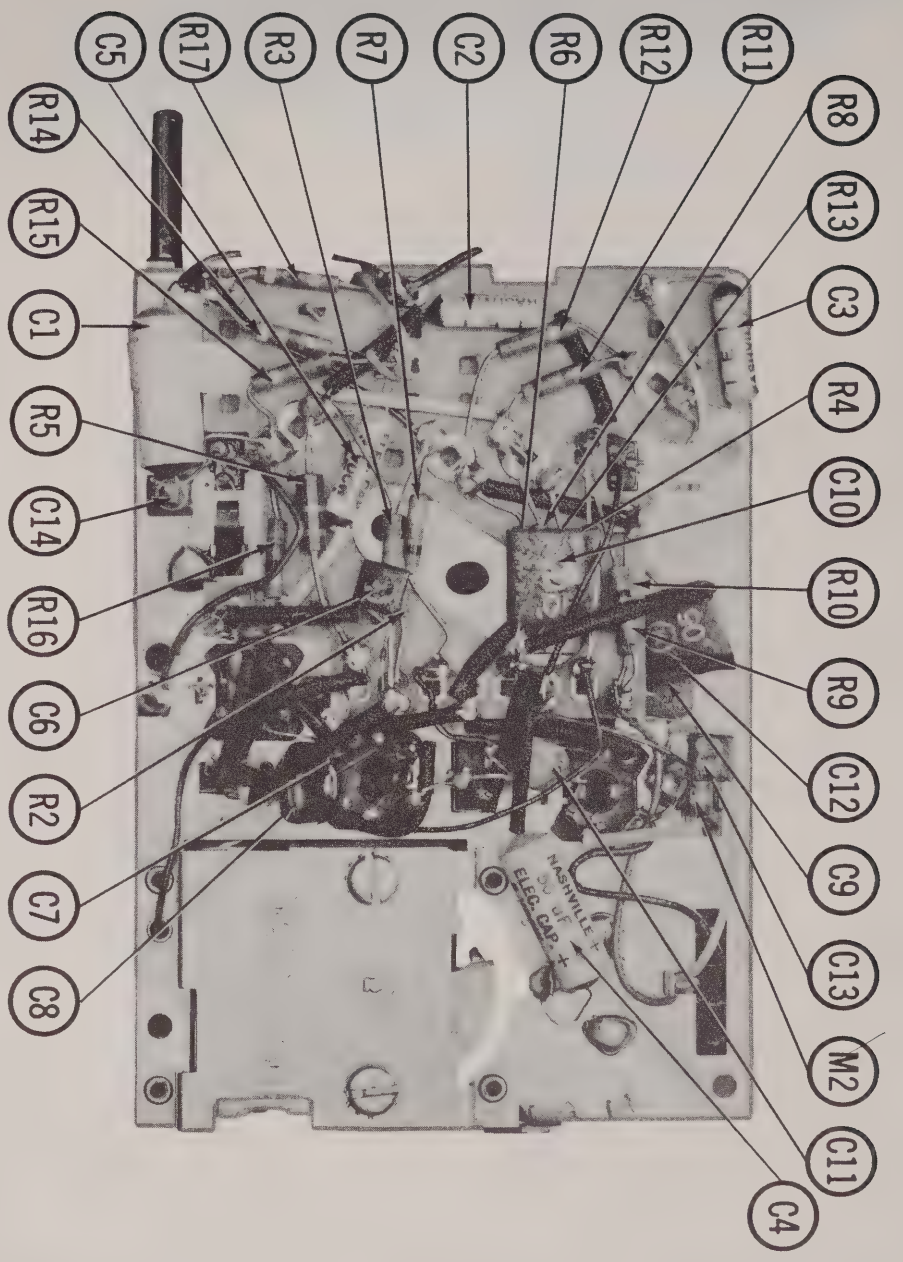
ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		TRUETONE PART No.	SYLVANIA PART No.	
M2	*1N295		1N60	Audio Det. (Pigtail)

*Some versions may use CK706A crystal diode in this application.

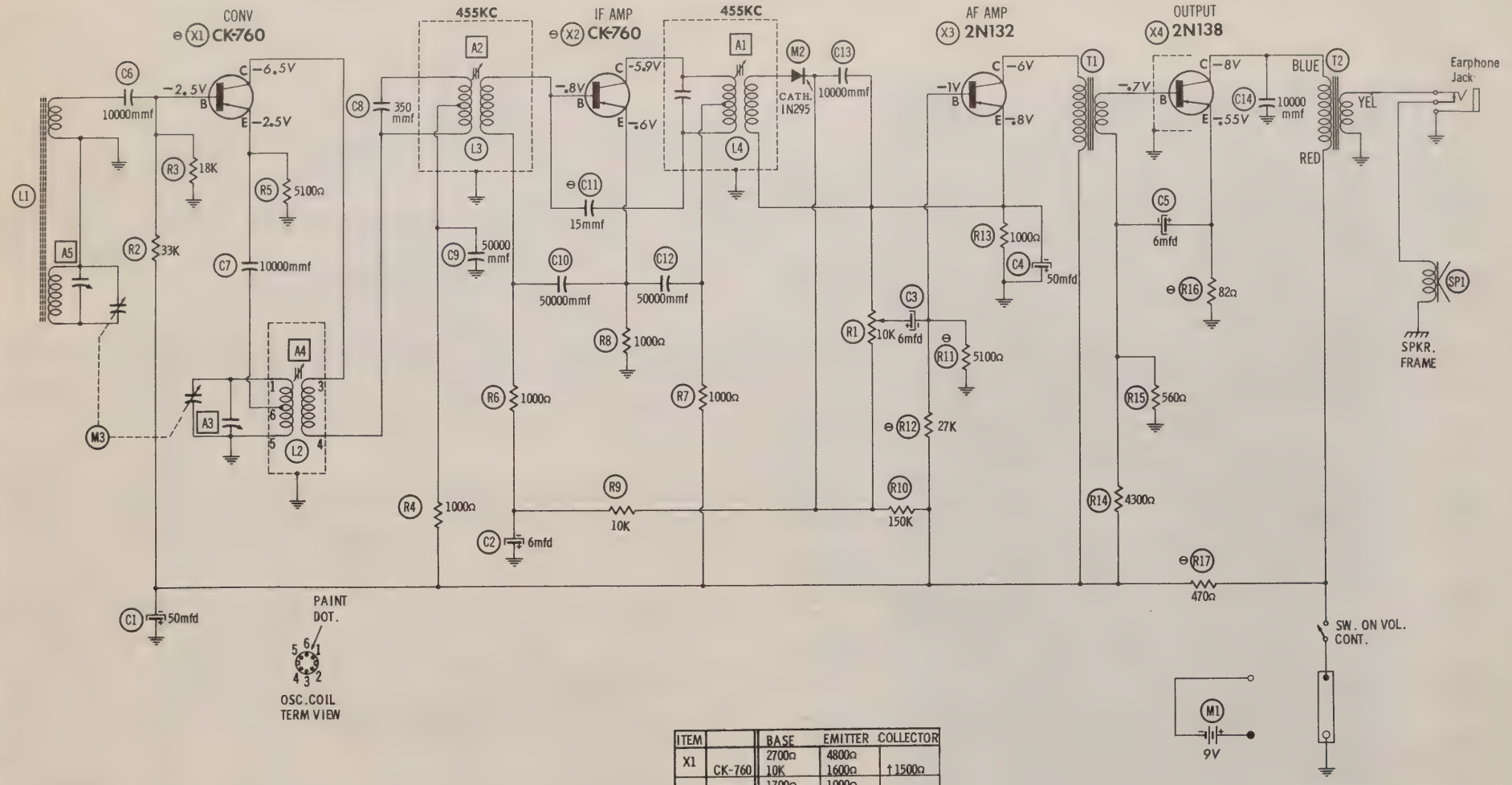
MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M3	Tuning Cap.	8A-26659	2 Gang (17-190MMF, 14-120MMF) - Note 1
	Case	5C-26567-A210	Pink
	Case Cover	5C-26486-A209	Grey
	Battery Cover Assy.	200-26449-A210	Pink
	Knob	3M-26400	Tuning
	Knob	5B-26356-A210	On-Off-Volume (Pink)
	Knob	4B-26782	On-Off-Volume

CHASSIS—BOTTOM VIEW



TRUETONE MODEL D3614A



ITEM		BASE	EMITTER	COLLECTOR
X1	CK-760	2700Ω 10K	4800Ω 1600Ω	†1500Ω
X2	CK-760	1700Ω 20K	1000Ω 800Ω	†1500Ω
X3	2N132	1200Ω 4200Ω	850Ω 700Ω	†1300Ω
X4	2N138	400Ω 600Ω	73Ω 67Ω	†19Ω

DUAL READINGS INDICATE REVERSAL OF METER LEADS.
† MEASURED FROM JUNCTION OF R17 AND ON-OFF SWITCH.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

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PHOTOFACT* Folder

*TRADE MARK

TRUETONE
MODEL 2D2520A, B

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Model 2D2520A

TRADE NAME	Truetone Model 2D2520A, 2D2520B
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	Television Receiver
TUBES	Fifteen
POWER SUPPLY	105-115 Volts AC-60 Cycles RATING 1.13 Amp. @115 Volts AC
TUNING RANGE	Channels 2 thru 13, Video IF 26.75MC, Sound IF 21.25MC (Intercarrier)

INDEX

Alignment Instructions 6
Disassembly Instructions 1
Horizontal Sweep Circuit Adjustments 14
Parts List and Descriptions 12, 13
Photographs
Cabinet-Rear View 14
Capacitor & Alignment Identification 3, 10
Chassis-Top View 11
RF Tuner 7
Photographs (Cont)
Resistor & Inductor Identification 4, 9
Resistance Measurements 8
Servicing in the Field 1
Schematic (TV) 2
Terminal Location Chart 15
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

TRUETONE
MODEL 2D2520A, B

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MODEL 2D2520A, B

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DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 push-on type control knobs from top panel of cabinet.
2. Remove 5 metal screws. Remove rear cover.
3. Place receiver with rear side up on a soft surface.
4. Remove 2 metal screws holding AC interlock-antenna bracket and remove.
5. Remove 2 chassis mounting screws from bottom side of cabinet. Return receiver to normal upright position.
6. Disconnect speaker leads and picture tube socket.
7. Remove ion trap and remove wing nut from top of yoke and remove yoke from picture tube neck.
8. Remove chassis screws on each side of cabinet.
9. Remove chassis by pulling bottom out first (with the right side on an angle toward the back) from cabinet.
10. Remove 2 speaker nuts. Remove speaker.

MODEL

2D2520A

TRUETONE
MODEL 2D2520A, B

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustment of VHF tuner oscillator adjustments, it is necessary to remove the chassis from the cabinet. (See disassembly instructions)

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to the set. Adjustment is located on the rear side of the chassis. Set the horizontal hold control at the center range and adjust the horizontal frequency coil (L16) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the buzz (R7) located on the rear side of the chassis for maximum sound and MINIMUM buzz.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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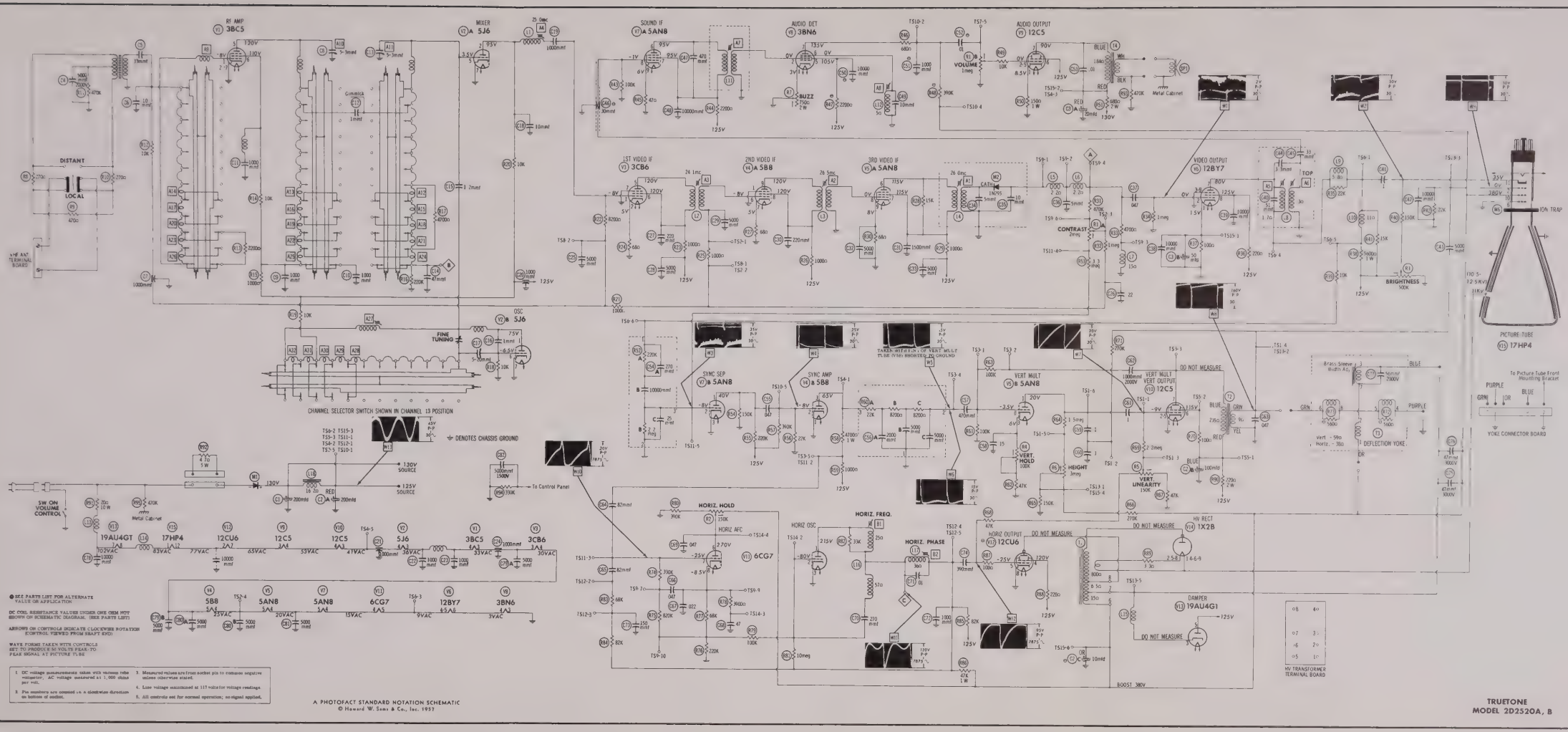
DATE 1-57 SET 343 FOLDER 15


TRUETONE
MODEL 2D2520A, B
RF AMP
Y1 3BC5
MIXER
Y2 A 5J6
SOUND IF
Y7 A 5AN8
AUDIO DET
Y8 3BN6
AUDIO OUTPUT
Y9 12C5
1ST VIDEO IF
Y3 3CB6
2ND VIDEO IF
Y4 5B8
3RD VIDEO IF
Y5 A 5AN8
VIDEO OUTPUT
Y6 12BY7
SYNC SEP
Y7 B 5AN8
SYNC AMP
Y4 B 5B8
VERT MULT
Y6 B 5AN8
VERT MULT VERT OUTPUT
Y10 12C5
OSC
Y2 B 5J6
HORIZ OSC
HORIZ. FREQ.
HORIZ. PHASE
HORIZ OUTPUT
DO NOT MEASURE
V12 12CU6
HV RECT
V14 1X2B
DAMPER
V13 19AU4G1
HORIZ. HOLD
HORIZ AFC
V11 6CG7
DISTANT
LOCAL
FINE TUNING
VOLUME
BUZZ
CONTRAST
BRIGHTNESS
HEIGHT
VERT. HOLD
VERT. LINEARITY
ION TRAP
PICTURE TUBE
V15 17HP4
YOKE CONNECTOR BOARD
DEFLECTION YOKE
Metal Cabinet
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
DENOTES CHASSIS GROUND
130V SOURCE
125V SOURCE
To Control Panel
SW ON VOLUME CONTROL
V13 19AU4GT
V15 17HP4
V12 12CU6
V9 12C5
V10 12C5
V2 5J6
V1 3BC5
V3 3CB6
V4 5B8
V5 5AN8
V7 5AN8
V11 6CG7
V6 12BY7
V8 3BN6
BOOST 380V
HV TRANSFORMER TERMINAL BOARD
RF ANT TERMINAL BOARD
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 80 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
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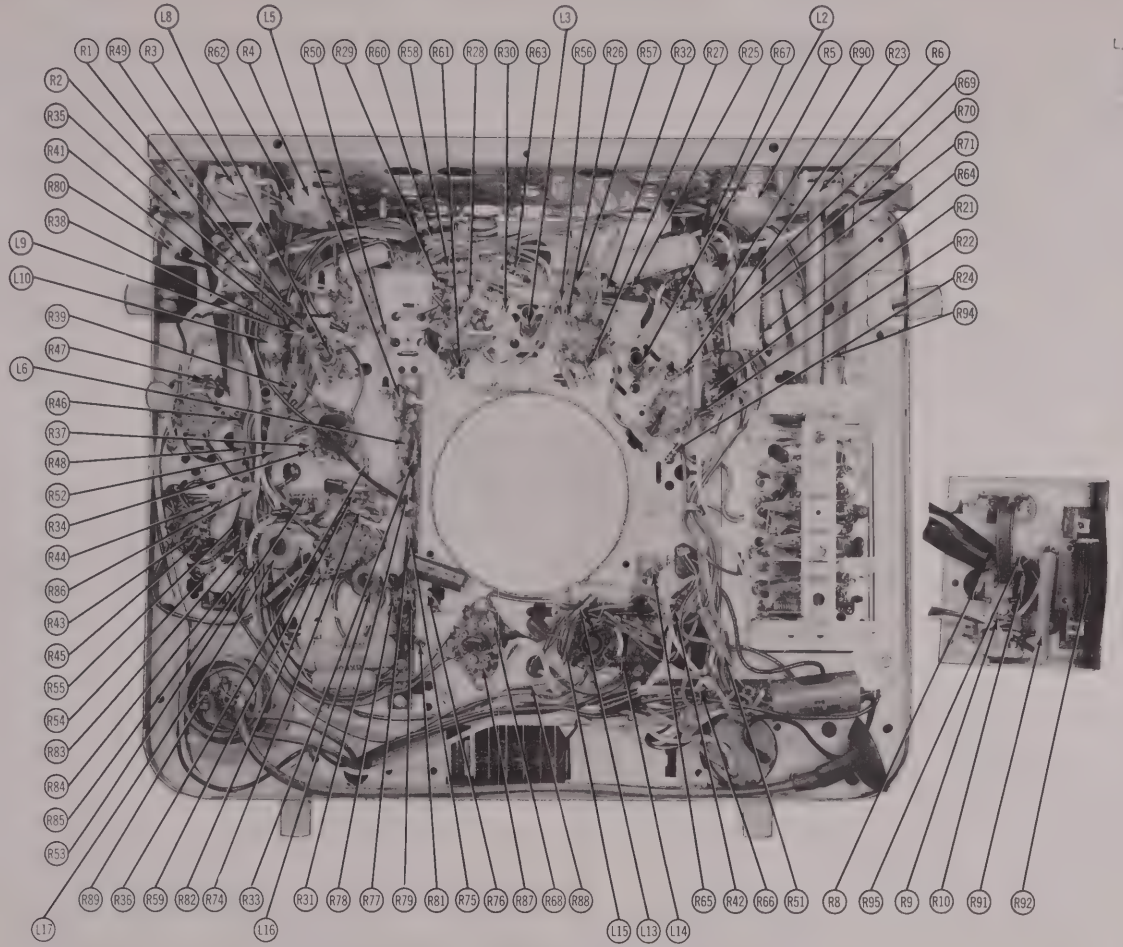

CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

TRUETONE
MODEL 2D2520A,B

TUBE PLACEMENT CHART

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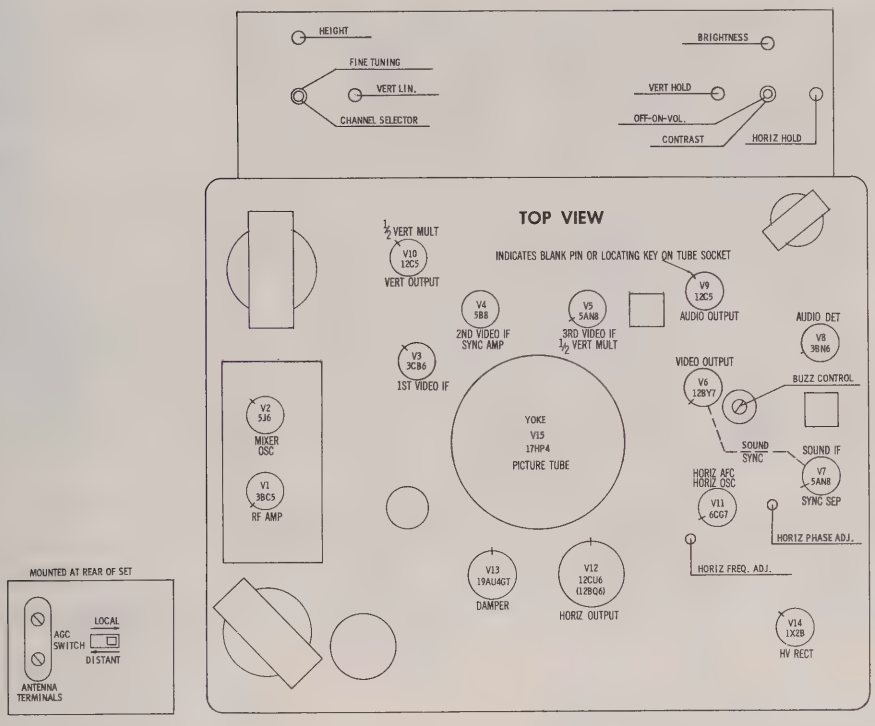
3821 MEADE ST.
DENVER, COLORADO



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

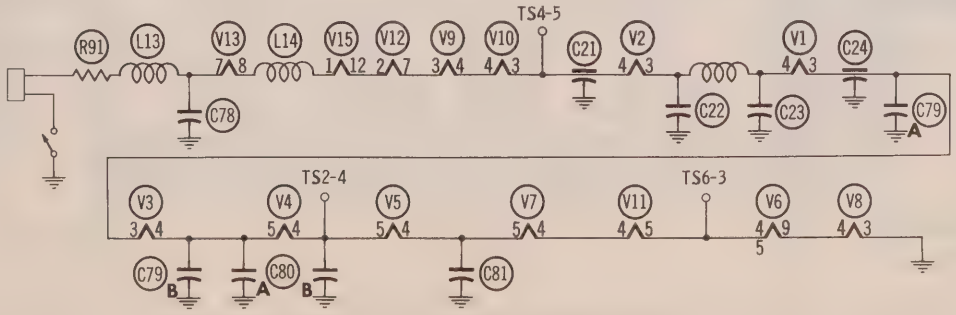
POWER SUPPLY FAILURE
No raster, no sound - Selenium Rectifier (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V15
Has pic, no sound - V7, V8, V9

SYNC FAILURE
No vert. sync - V4, V5, V10
No horiz. sync - V4, V11
No vert. or horiz. sync - V4, V7

SWEEP FAILURE
No raster, has sound - V11, V12, V13, V14, V15
No vertical deflection - V5, V10
Poor vert. linearity or foldover - V5, V10
Poor horiz. linearity or foldover - V11, V12, V13
Narrow picture - V11, V12, V13, V14, M1
Vert. off freq. - V4, V5, V10
Horiz. off freq. - V4, V11

NOTE: Since this receiver employs tubes used in series filament network, an open filament in any tube in series will cause the set to be inoperative. (See circuit below).



TRUETONE
MODEL 2D2520A,B

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V11) to disable the high voltage.
Use an isolation transformer to protect the test equipment.

VIDEO IF ALIGNMENT

Connect a 1000MMF capacitor across the scope terminals. Use only enough generator output to maintain approximately 2 volts on the VTVM.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating above converter tube. Low side to chassis.	Not used	26.0MC (Unmod)	4	USE VTVM. DC probe to point (A). Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	"	26.5MC	"	"	A2	"
3.	"	"	"	24.1MC	"	"	A3	"
4.	"	"	"	25.0MC	"	"	A4	"
5.	"	"	25MC (10MC Swp)	23.8MC 26.65MC	"	Vert. Amp. thru 10K to point (A). Low side to chassis.		Check for response curve similar to Fig.1. If necessary, retouch A1 thru A4 to obtain desired response.

4.5MC TRAP ALIGNMENT

Tune in a TV station and adjust the fine tuning until sound bars just appear. Turn A5 full counter clockwise, then clockwise until the horizontal scanning lines are smooth and continuous. Readjust the fine tuning for best picture and clearest sound.

SOUND IF ALIGNMENT

Tune in a TV station and reduce the signal strength at the antenna terminals by using an attenuator or similar device until the signal is below the limiting level of the 3BN6 (V8) as indicated by a hiss in the sound. Adjust A6, A7, A8 and R7 for maximum clear sound and minimum buzz. If the hiss disappears during these adjustment, reduce signal strength until hiss returns.

RF AND MIXER ALIGNMENT

Connect the negative lead of a 1.5 volt bias supply to the ungrounded side of C25. Connect the positive side to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point (B). Low side to chassis.	A9, A10, A11	Adjust for maximum response with markers as shown in Fig. 2.
7.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A12, A13, A14	"
8.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5		A15, A16, A17	"
9.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4		A18, A19, A20	"
10.	"	"	63MC (10MC Swp)	61.25MC 65.75MC	3		A21, A22, A23	"
11.	"	"	57MC (10MC Swp)	55.25MC 59.75MC	2		A24, A25, A26	"

OSCILLATOR ALIGNMENT

Leave bias connected as under "RF and Mixer Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
All coil adjustments except A45 are made by expanding or compressing coil turns.
Use only enough sweep generator output to provide usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A27	Adjust to place sound marker in trap notch as in Fig. 3. Video marker should be at 50%.
13.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A28	Adjust to place sound marker in trap notch as in Fig. 3. Video marker should be at 50%. Adjustments are made by expanding or compressing coil turns.
			79MC (10MC Swp)	77.25MC 81.75MC	5		A29	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A30	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A31	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A32	

FIG. 1

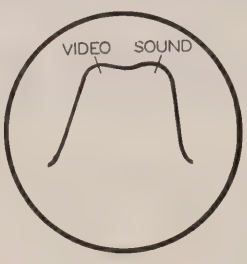


FIG. 2

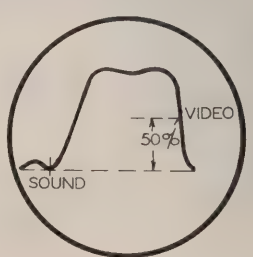
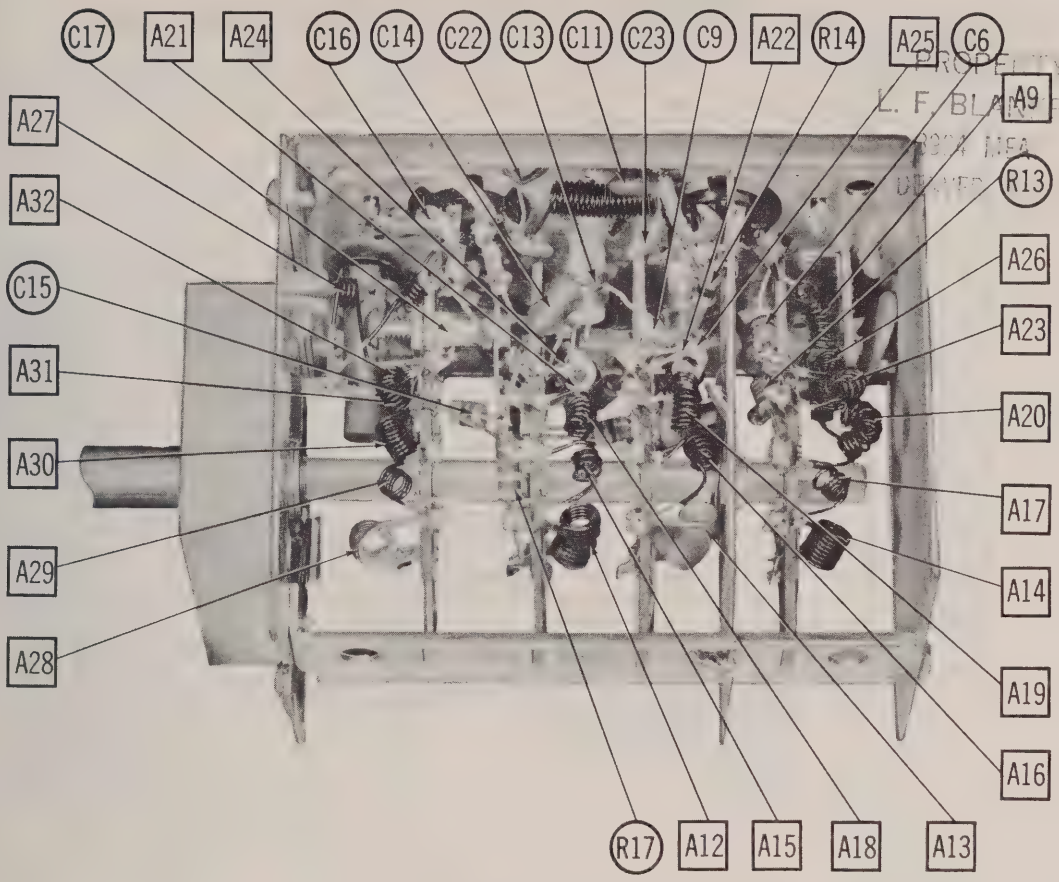
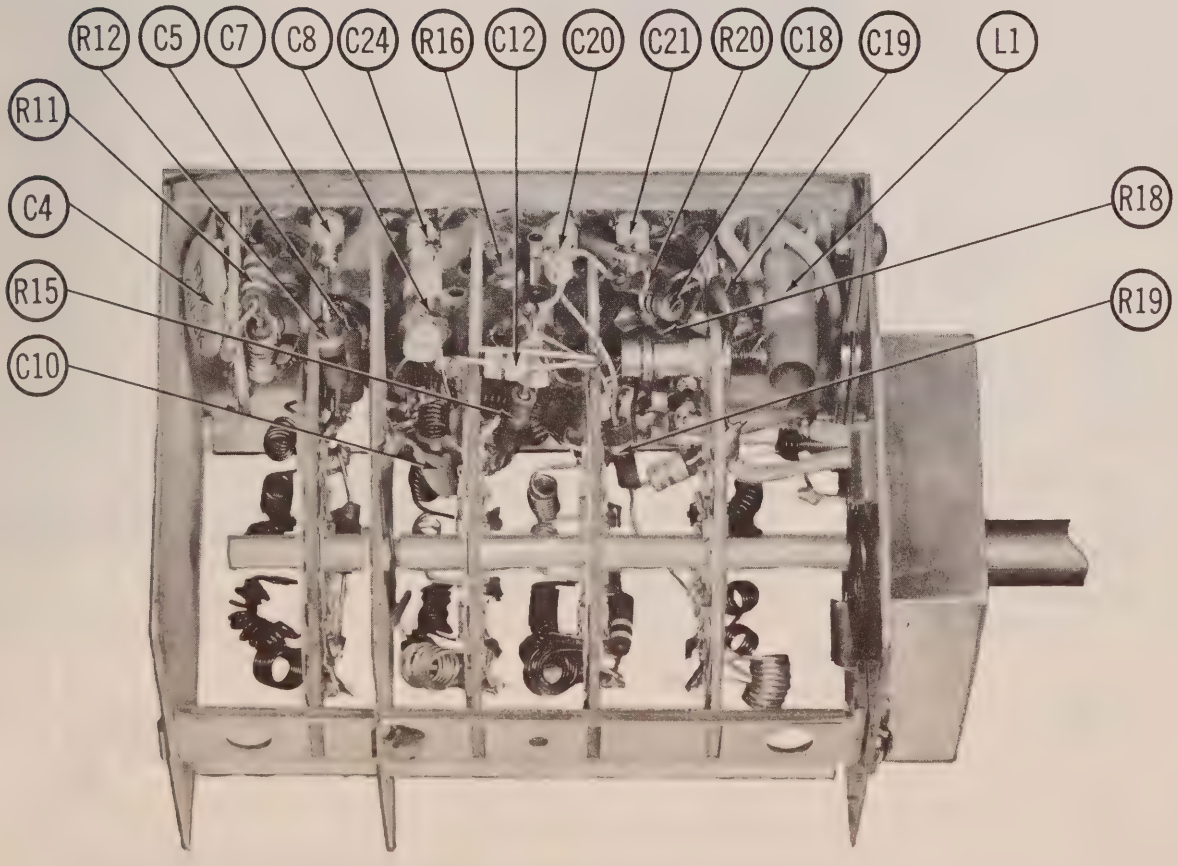


FIG. 3



RF TUNER-RIGHT SIDE

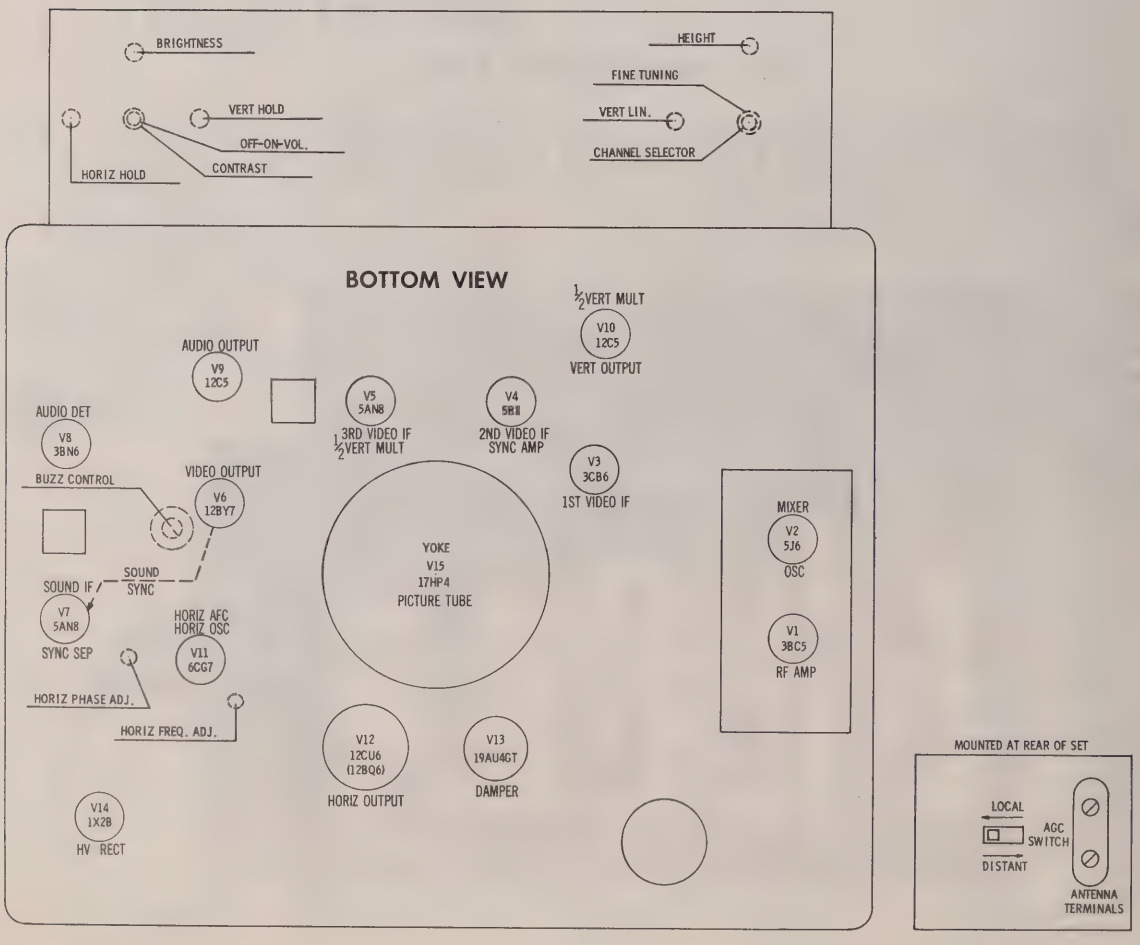


RF TUNER-LEFT SIDE

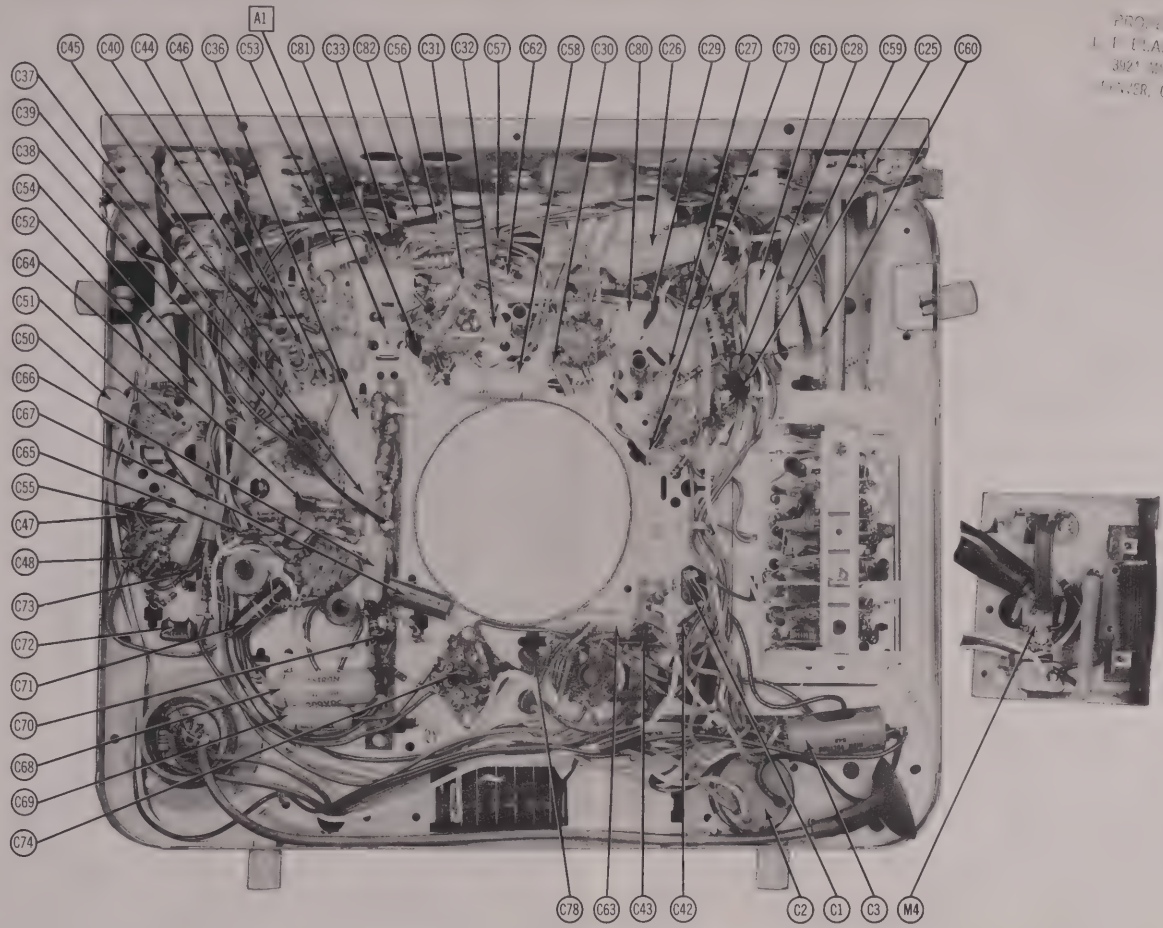
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BC5	▪ 1.5Meg	0Ω	8Ω	9Ω	†1000Ω	†11K	0Ω		
V2	5J6	†10K	†10K	9Ω	10Ω	220K	10K	0Ω		
V3	3CB6	● 1.5Meg	68 Ω	8Ω	7Ω	†1000Ω	†1000Ω	0Ω		
V4	5B8	0Ω	22K	†5700Ω	6Ω	7Ω	●1.5Meg	68Ω	†1000Ω	†1000Ω
V5	5AN8	● ▪2Meg	100K	● 60K	5Ω	6Ω	†1000Ω	†1000Ω	.3Ω	68Ω
V6	12BY7	100Ω	1Meg	0Ω	2Ω	2Ω	1Ω	†4000Ω	†235Ω	0Ω
V7	5AN8	†90K	1.5Meg	0Ω	4Ω	5Ω	†2200Ω	†2200Ω	100K	47Ω
V8	3BN6	● 250Ω	.2Ω	0Ω	1Ω	†2200Ω	5Ω	▪390K		
V9	12C5	150Ω	● 500K	15Ω	12Ω	● 500K	†16Ω	†750Ω		
V10	12C5	0Ω	● 2Meg	10Ω	12Ω	● 2Meg	†330Ω	†460Ω		
V11	6CG7	▪47K	320K	0Ω	4Ω	2Ω	●▪75K	1.5Meg	280K	NC
V12	12CU6	TP	17Ω	TP	†235Ω	220K	TP	15Ω	0Ω	TOP CAP ▪7Ω
V13	19AU4GT	TP	NC	70K	NC	†16Ω	TP	22Ω	19Ω	
V14	1X2B		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▪800Ω
V15	17HP4	19Ω	22K	PIN 6 0Ω	PIN 10 ▪17Ω	PIN 11 ● †220K	PIN 12 17Ω			

● THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM OUTPUT OF MI.
▪ MEASURED FROM PIN 3 OF V13.
TP TIE POINT
NC NO CONNECTION.



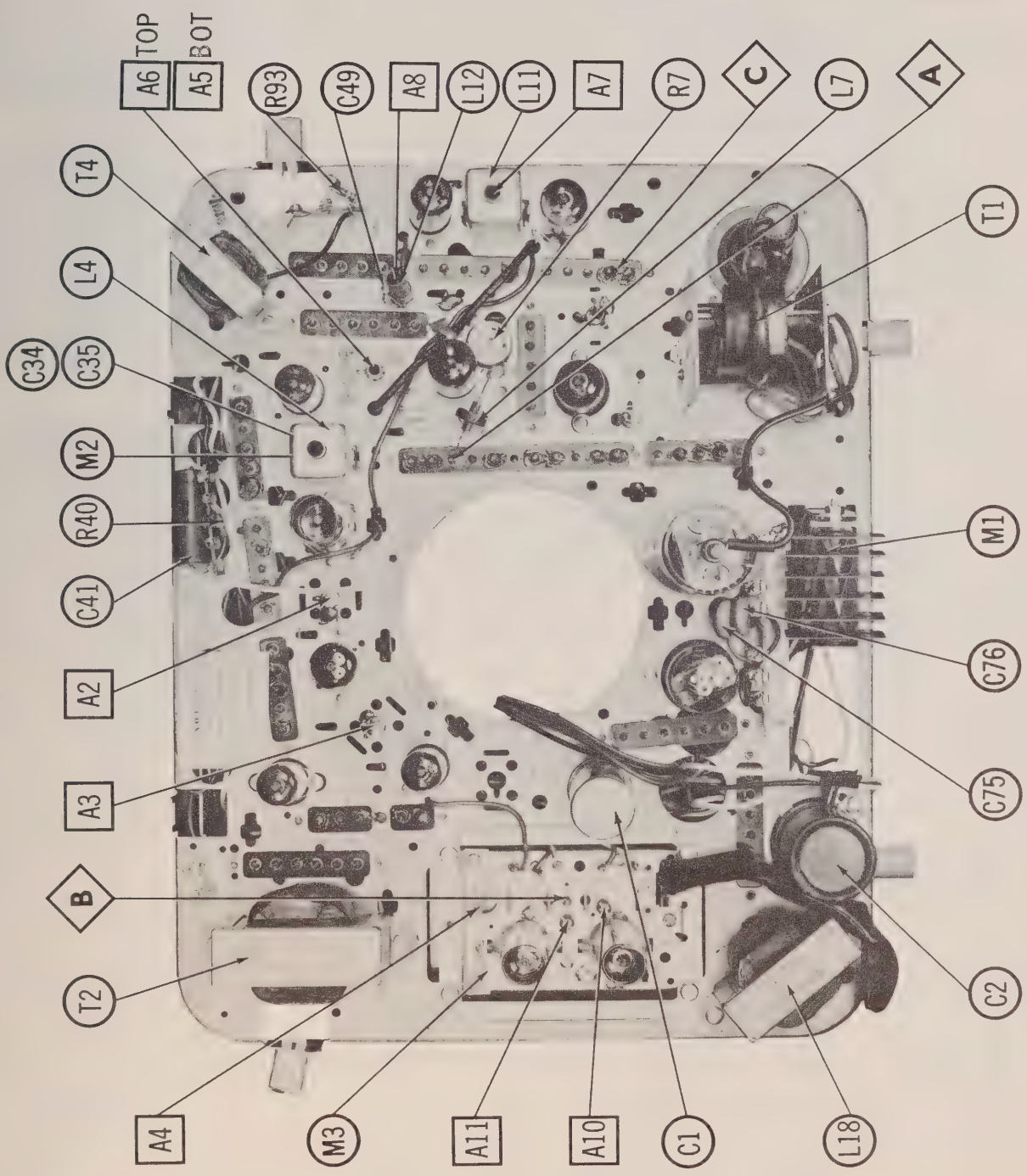
TUBE PLACEMENT CHART



PROPERTY OF
L. F. BLANKENSHIP
3921 W. [illegible] S.
DENVER, COLORADO

CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

PROPERTY OF
F. BLANKENSHIP



CHASSIS TOP VIEW

TRUETONE
MODEL 2D2520A,B

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	RF Amp.	3BC5	
V2	Mixer-Osc.	5J6	
V3	1st Video IF Amp.	3CB6	
V4	2nd Video IF Amp. - Sync Amp.	5B8	
V5	3rd Video IF Amp - Vert. Mult.	5AN8	
V8	Video Output	12BY7	

ITEM No	USE	TYPE	NOTES
V7	Sound IF Amp. - Sync Sep.	8AN8	
V8	Audio Det.	3BN6	
V9	Audio Output	2C5	
V10	Vert. Mult. - Vert. Output	2C5	
V11	Horiz. AFC - Horiz. Osc.	6CB7	
V12	Horiz. Output	12CL8	Note 1
V13	Damper	19AU4GT	
V14	HV Rectifier	1X2B	

Note 1: 12BQ6 may be used in some versions.

PICTURE TUBE

ITEM No	REPLACEMENT DATA				NOTES
	TRUETONE PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V15	17BP4	17BP4-A 17RP4 17BP4B ①	17BP4 17RP4 17BP4A ①	17BP4 17RP4	① Aluminized ② Silver Screen -85

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	TRUETONE PART No.	AEROVOX PART No.	CORNELL DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	300	150	8C-ST530	AFBIII-71		VA1250	TFU-17 TFC-49 WT447	TD-385 ① MT-1560 D-1000 MT-4510	R3296*
C3A	300	150	8C-ST531	PR3-054	XD308 HR1045				R3295*
B	100	150	Note 1						
C3A	20	150	8C-ST519	RR1038	HR2015 HR3102	TCD497	TD-20-150 TD-50-15	FM-1520 FM-0250	R3297*
B	20	25							

Note 1: When C3C is rated at 400volts, C3 part no. is 8C-ST508.
* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	5000	2000	RC6-90087							
C5	33		RC6-90080							
C6	10		RC6-90083	MPG-4H10	TCZ-10	TZ09	MP0A-100	Z7-541	5TCC-Q8	
C7	1000		RC6-91038							
C8	8-8		RC6-91037		839-3		31H5-01-ORS	CT345A		
C9	1000		RC6-90059	BPD-001	DD-102	KD09	801-001	DC531	5HK-D1	
C10	1000		RC6-90059	BPD-001	DD-102	KD09	801-001	DC531	5HK-D1	
C11	1000		RC6-90059	BPD-001	DD-103	KD09	801-001	DC531	5HK-D1	
C12	5		RC6-90027	MPG-401	TZ-11	TZ03	MP0A-010		5TCC-B-V1	
C13	8-8		RC6-91037		839-3		31H5-01-ORS	CT356A		
C14	47		RC6-90035	6547	D6-470	TP39	GP1K-470	UC-5447	5GA-Q47	
C15	L 3		RC6-90034							
C16	1		RC6-90070							
C17	5-30		RC6-91038							
C18	10		RC6-90083	MPG-4E10	TCZ-10	TZ09	MP0A-100	Z7-541	5TCC-Q8	
C19	1000		RC6-90059	BPD-001	DD-103	KD09	801-001	DC531	5HK-D1	
C20	1000		RC6-91038							
C21	1000		RC6-91036							
C22	1000		RC6-90059	BPD-001	DD-103	KD09	801-001	DC531	5HK-D1	
C23	1000		RC6-90059	BPD-001	DD-103	KD09	801-001	DC531	5HK-D1	
C24	1000		RC6-90059	BPD-001	DD-102	KD09	801-001	DC531	5HK-D1	
C25	1000		RC6-91036							
C26	5000			BPD-005	DD-503	KD30	811-005	DC535	5HK-D5	
C27	250	200		PS6M-25		CUBP32		PT4G32	5TM-P32	
C28	330			6S330	D6-331	TP39	GP5K-221	UC-5332	5GA-T32	
C29	5000			BPD-005	DD-503	KD30	811-005	DC535	5HK-D5	
C30	5000			BPD-005	DD-503	KD30	811-005	DC535	5HK-D5	
C31	330			6S330	D6-331	TP39	GP5K-221	UC-5332	5GA-T32	
C32	1500			BPD-0015	DD-153	D171	801-0015	DC515	5HK-D15	
C33	5000			BPD-005	DD-503	KD30	811-005	DC535	5HK-D5	
C34	5000			BPD-005	DD-503	KD30	811-005	DC535	5HK-D5	
C35	5			MPG-4E5	TCZ-4R7	Z01L	MP0A-050	Z7-505	5TCCB-V47	
C36	10			MPG-4E10	TCZ-10	TZ09	MP0A-100	Z7-541	5TCC-Q8	
C37	5			MPG-4E5	TCZ-4R7	Z01L	MP0A-050	Z7-505	5TCCB-V47	
C38	.047	200		BPD-05	DY-503	CUBZ447		PT4417	5TM-S47	
C39	10000			BPD-01	DD-103	KD09	811-01	DC531	5HK-S1	
C40	10000			BPD-01	DD-103	KD09	811-01	DC531	5HK-S1	
C41	.01	400		6S10-401	DD-103	KD09	801-001	DC531	5HK-D1	Note 2
C42	1	400		P6S8N-1	DF-104	CUB4P1		PT401	4TM-P1	Note 2
C43	10000			BPD-01	DD-103	KD09	811-01	DC531	5HK-S1	
C44	10000			BPD-01	DD-103	KD09	811-01	DC531	5HK-S1	
C45	3.3			MPG-4E3.3	TCZ-3R3	TZ06	MP0A-3R3	Z7-5533	5TCCB-V33	
C46	33			MPG-4E33	TCZ-33	TZ18	MP0L-330	Z7-5633	5TCC-Q33	
C47	36		143-33772							Note 3
C48	470			1484-00047	D5-471	5RS747	31J-471		MS-347	
C49	10000			BPD-01	DD-103	KD09	811-01	DC531	5HK-S1	
C50	10			MPG-4E10	TCZ-10	TZ09	MP0A-100	Z7-541	5TCC-Q8	
C51	10000			BPD-01	DD-103	KD09	811-01	DC531	5HK-S1	Note 2
C52	1000			BPD-001	DD-102	KD09	801-001	DC531	5HK-D1	Note 2
C53	.01	400		BPD-01	DD-103	CUB4D	GP3-233-103	PT401	4TM-S1	Note 2
C54	.01	400		BPD-01	D6-103	CUB4D	GP3-233-103	PT401	4TM-S1	
C54A	270					B PT41	31J-271	DC-5327		
B	10000		117A-34213	72C-253	72C-263	TP87	31J-01	DC-5311	78T-3	
C	25					TP25	831-250	DC-5425		
C55	.047	200		BPD-05	DF-503	CUB3447		PT4417	3TM-S47	
C56A	3000							DC522		
B	5000		147A-33276	4PA-430	4PC-500	4U3TM1	4M05-01	DC525	4V-1	
C	5000							DC525		
C57	470			DI-00047	DD-471	QD80	31J-471	UC-5347	5GA-T47	
C58	18	200		P6S8N-15		CUB2P15		PT4015	2TM-P15	
C59	1	200		P6S8N-1	DF-104	CUB2P1		PT401	2TM-P1	
C60	1	200		P6S8N-1	DF-104	CUB3P1		PT401	3TM-P1	
C61	1	400		P4S8N-1	DF-104	CUB4P1		PT401	4TM-P1	
C62	1000	3000	8Q-34691	HVD-3D-1000	DD30-102	VD31	3KV-103	DC3031	30GA-D1	
C63	.047	400		BPD-05	DF-503	CUB4447		PT4417	4TM-S47	
C64	82			1484-00082	D5-820	32R5Q82	831-820		MS-482	
C65	82			1484-00082	D6-820	32R5Q82	831-820		MS-482	
C66	.047	200		BPD-05	DF-503	CUB2447		PT4417	2TM-S47	
C67	.033	200		BPD-03	DF-303	CUB2433	31T-03	PT4123	2TM-S33	
C68	47	200		P2S8N-47		CUB2P47		PT4047	2TM-P47	
C69	.047	400		BPD-05	DF-503	CUB4S47		PT4417	4TM-S47	
C70	270	400		1484-00027	D5-271	5RS727	31J-271		MS-327	
C71	.01	600								

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No	RATING		REPLACEMENT DATA						NOTES
	CAP	VOLT	TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C72	1000			464-001		1R5D1	811-103	MCB355	M8-31	
C73	150			NPO-H150		E2S5T15	811-151	MCB336	M8-316	
C74	390			6S390		E5S5T39	GP2K-391	UC-5339	5GA-T39	
C75	47	3000	8G-34038	HVD-30-470	DD30-470	VG47	3KV-470	DC30447	30GA-Q47	
C76	47	3000	8G-34038	HVD-30-470	DD30-471	VG47	3KV-470	DC30447	30GA-Q47	
C77	56	2000			DD30-560		3KV-560	DC30456	30GA-Q56	
C78	10000			BPD-01	DD-103	KD81	811-01	DC531	5HK-S1	
C79A	5000			BPD-005	DD-502	DK079	811-005	DC535	5HK-D5	
B	5000						811-005	DC535	5HK-D5	
C80A	5000			BPD-03005	DD2-502	DK079	811-005	DC535	5HK-D5	
B	5000						811-005	DC525	5HK-D5	
C81	5000			BPD-005	DD-502	KD80	811-005	DC525	5HK-D5	
C82	5000	1500		HVD-15-5000	DD15-502	VD15	15KV-472	PT1525	20HK-D5	

† Items C54A, C54B, C54C, R52A and R52B are combined in one unit.
* Items C54A, C54B, C54C, R50A, R50B and R50C are combined in one unit.
Note 1: In some versions items C50, C51, C52, R47 and R48 are combined in one unit. (part #17A-25143)
Note 3. C48 is the capacity of the sound take-off lead.

CONTROLS

ITEM No	RATING		REPLACEMENT DATA					NOTES
	RESISTANCE	WATTS	TRUETONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg		B10B-35281		RTV-500		UB1T3B	Contrast (Panel)
B	1Meg							Volume & Switch (Rear)
R2A	150K		B10B-32680-1	AB-43	A47-150K-S	Q11-338	TA184L	Horiz. Hold
B	Shaft		Not Req.	AK-4	KSB-3	Not Req.	Not Req.	Attach to R2A
R3A	500K		B10B-32695	AB-59	A47-500K-S	Q11-133	TA56L	Brightness
B	Shaft		Not Req.	AK-4	KSB-3	Not Req.	Not Req.	Attach to R3A
R4A	100K		B10B-32683	AB-40	A47-100K-S	Q11-138	PTA15L	Vert. Hold
B	Shaft		Not Req.	AK-4	KSB-3	Not Req.	Not Req.	Attach to R4A
R5A	150K		B10B-32693-1	AB-43	A47-150K-S	Q11-338	TA184L	Vert. Linearity
B	Shaft		Not Req.	AK-4	KSB-3	Not Req.	Not Req.	Attach to R5A
R6A	2Meg		B10B-32696	AB-84	A47-2Meg-S	Q11-140	TA26L	Bright
B	Shaft		Not Req.	AK-1	FSB-1	RQ	Not Req.	Attach to R6A
R7	750Ω	2	A10D-23577		38-750			Buzz

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	TRUETONE PART No.	IRC PART No.	
R8	270Ω			BTS-270	
R9	470Ω			BTS-470	
R10	270Ω			BTS-270	
R11	470K			BTS-470K	
R12	10K			BTS-10K	
R13	2200Ω			BTS-2200	
R14	10K			BTS-10K	
R15	1000Ω			BTS-1000	
R16	330K			BTS-330K	
R17	470Ω			BTS-470Ω	
R18	10K			BTS-10K	
R19	10K			BTS-10K	
R20	10K			BTS-10K	
R21	1000Ω			BTS-1000	
R22	8200Ω				
R23	1000Ω			BTS-1000	
R24	68Ω			BTS-68	
R25	1000Ω			BTS-1000	
R26	1000Ω			BTS-1000	
R27	68Ω			BTS-68	
R28	15K 5%			BTS-15K	
R32	1Meg			BTS-1Meg	
R33	4700Ω			BTS-4700	
R34	1Meg			BTS-1Meg	
R35	33K			BTS-33K	
R36	220Ω			BTS-220	
R37	100Ω			BTS-100	
R38	5600Ω	1		BTA-5600	
R39	18K			BTS-18K	
R40	150K			BTS-150K	
R41	15K 5%			BTS-15K 5%	
R42	22K			BTS-22K	
R43	100K			BTS-100K	
R44	3200Ω			BTS-3200	
R45	47Ω			BTS-47	
R46	680Ω			BTS-680	
R47	2200Ω			BTS-2200	Note 1
R48	390K			BTS-390K	Note 1
R49	10K			BTS-10K	
R50	150Ω	1		BTA-150	
R51	680Ω	2		BTS-680	
R52A	220K		117A-24213	BTS-220K	
B	2.2Meg			BTS-2.2Meg	

ITEM No	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	TRUETONE PART No.	IRC PART No.	
R53	3.3Meg			BTS-3.3Meg	
R54	150K			BTS-150K	
R55	220K			BTS-220 K	
R56	22K			BTS-22K	
R57	390K			BTS-390K	
R58	4700Ω	1		BTA-4700	
R59	1000Ω			BTS-1000	
R60A	25K			BTS-22K	
B	2200Ω		147A-33276	BTS-2200	
C	8200Ω			BTS-8200	
R61	100Ω			BTS-100K	
R62	47K			BTS-47K	
R63	100K			BTS-100K	
R64	1.5Meg			BTS-1.5Meg	
R65	150K			BTS 150K	
R66	270K			BTS-270K	
R67	47K			BTS-47K	
R68	47K			BTS-47K	
R69	2.2Meg			BTS-2.2Meg	
R70	100Ω			BTS-100	
R71	470K			BTS-470K	
R72	560Ω				Note 2
R73	560Ω				Note 2
R74	330K			BTS-330K	
R75	820K			BTS-820K	
R76	220K			BTS-220	
R77	68K			BTS-68K	
R78	3900Ω				
R79	100K				
R80	390K				
R81	100Ω				
R82	33K				
R83	68K			BTS-68K	
R84	82K			BTS-82K	
R85	68K			BTS-82K	
R86	47K	1		BTA-47K	
R87	100Ω			BTS-100	
R88	220Ω			BTS-220	
R89	3.3Ω		9C1-1069	BW1-3.3	
R90	220Ω	2		BTB-220	
R91	20Ω	10	9C-30063	PWH-20	
R92	4.7Ω	5	46M-25577		
R93	470K			BTS-470K	
R94	330K			BTS-330K	
R95	470K			BTS-470K	

† Items R55A, R55B, C54A, C54B, C54C are combined in one unit.
* Items R50*, R50B, R50C, C54A, C54B, C54C are combined in one unit.
Note 1: In some versions, items R47, R49, C50, C51, C52 are combined in one unit. (Part #17A-25143).
Note 2. Some versions use a 680Ω resistor in this application.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	TRUETONE PART No.	Hallderson PART No.	Merit PART No.	RCA TYPE No	Ram PART No	Stancor PART No	Thordorson PART No	Triad PART No
T1	Horiz. Output Trans.	13E-28007							
T2	Vert. Output Trans.	13E-2510-1	21900 ①						
T3A	Yoke-Horiz. (25MH)	20I-28019	DF900 ②③	MDF-75④		Y70F25 ②④	DY-15A ④	Y-19 ④	Y-19-1 ④
B	Vert. (43MH)	16M-24493 ②							

① Use 5 to 1 turns ratio.
② Yoke rear cover and centering device.
③ Requires new centering device.
④ Connect horizontal yoke damping network across terminals #3 and #7. Use original if necessary.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	TRUETONE PART No.	Hallderson PART No.	Merit PART No.	Stancor PART No.	Thordorson PART No.	Triad PART No.
T4	3.5KΩ	3-4Ω	13C-28148-1	21001	A-3339	A-3978	24S50	S-3X

SPEAKER

ITEM No.	RATINGS				REPLACEMENT DATA		NOTES
	SIZE	FIELD	V C IMP.		TRUETONE PART No	RCA PART No	TYPE No
SP1	4	PM	3-4Ω		18A-25934	4A07	22391

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	1st. Video IF	.4Ω						
L2	2nd. Video IF	.3Ω	.3Ω	13A-28140	17-1064	TV-116	6349	
L3	3rd. Video IF	.3Ω	.3Ω	13A-28139	17-1064	TV-116	6350	
L4	4th. Video IF	.3Ω	.3Ω	13B-28001				
L5	Series Peaking Coil	2.3Ω		20I-15608	19-6023		6626	Part number includes MC, C34, C35
L6	Series Peaking Coil	2.2Ω		20I-15606	19-6023		6626	30 Microhenries
L7	Shunt Peaking Coil	15Ω		18A-34375			6156	770 Microhenries
L8A	4.5MC Trap	1.7Ω						
B	1st. Sound IF	3Ω		20I-23730-1				
L9	Series Peaking Coil	6.8Ω		16A-34080	19-3180	TV-184	6180	170 Microhenries
L10	Shunt Peaking Coil	11Ω		18A-24019	19-3500		6138	480 Microhenries
L11	2nd. Sound IF	.2Ω	.2Ω	20I-23673				
L12	Quadrature Coil	8Ω		20I-23727	20-1005		1680	
L13	Fil. Choke	.5Ω		18A-26520	19-1004		6610	6 Microhenries
L14	Fil. Choke	.5Ω		18A-26520	19-1004		6610	6 Microhenries
L15	RF Choke	.5Ω		18A-26520	19-1004		6610	6 Microhenries

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA							NOTES
	PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordorson PART No.	
L16	62Ω		20I-24473-1		6313					Tapped @ 5TO-Horiz. Osc. Horiz. Phase
L17	38Ω		20I-24473-2		6314					

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE IS CURRENT (100 V_{dc})	TRUETONE PART No	Hallderson PART No	Merit PART No	Stancor PART No	Thordorson PART No	Triad PART No	
L18	.250A	16.2Ω	.7H	16B-26438				28C44	C-33X	

SELENIUM RECTIFIER

ITEM No.	RATING		REPLACEMENT DATA					NOTES
	CURRENT		TRUETONE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.300A		21J25315	1241A	MR350	6U350	6QA3	350A	

CRYSTAL DIODES

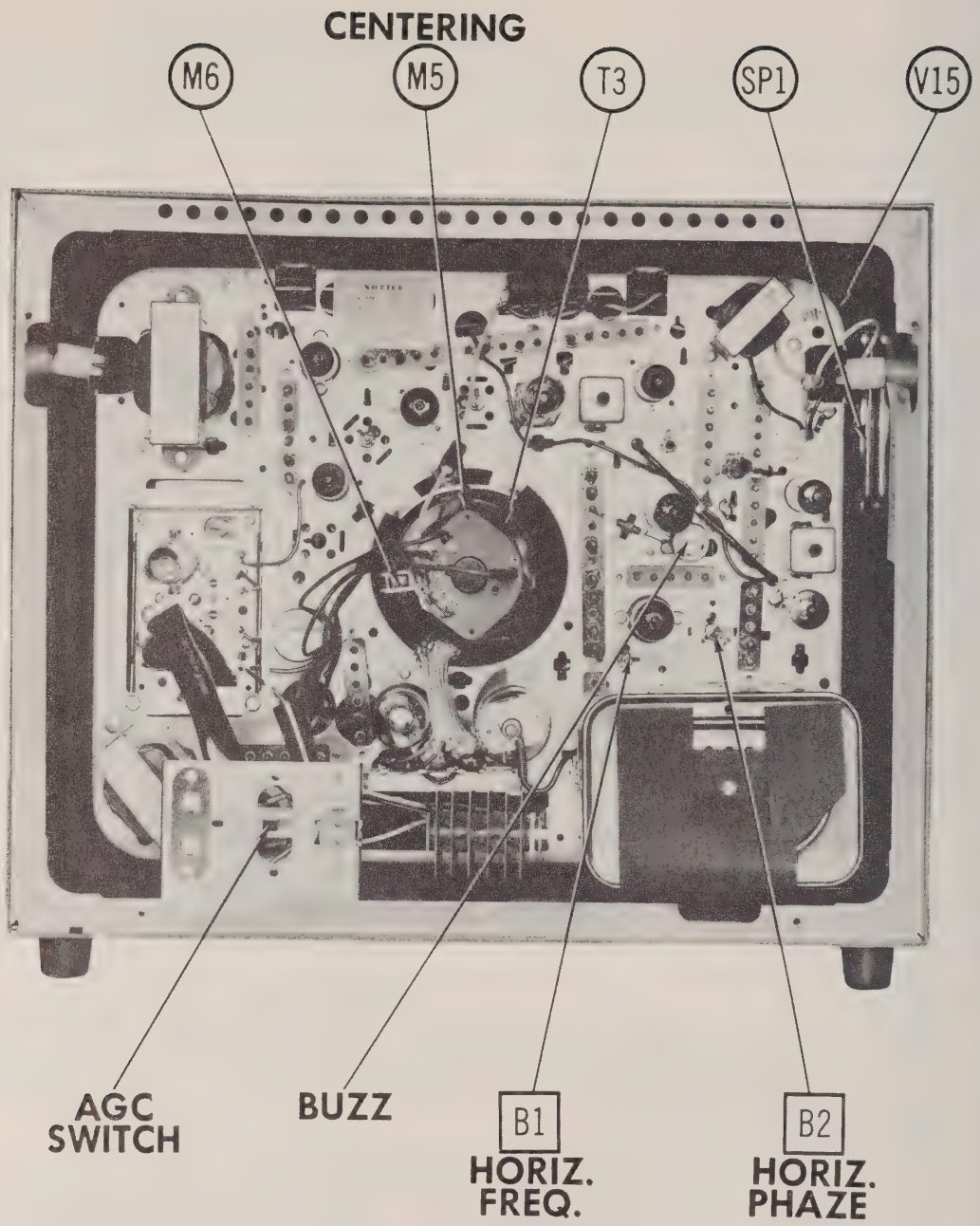
ITEM No.	CRYSTAL TYPE	REPLACEMENT DATA			NOTES
		TRUETONE PART No.	SYLVANIA PART No		
MC1	1N295*			Video Detector (Digital)	

* Some versions may use crystal diode type CK706A in this application.

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M3	Tuner	21I-26029	VHF
M4	Switch		Area Selector (DPDT - Slide Type)
M5	Centering Device	16M-24493	Includes deflection yoke (T3) Rear Cover
M6	Ion Trap	16M-19706	
	Cabinet	200-25557-2	Model 2D2520A
	Cabinet	200-25557-4	Model 2D2520B
	Handle	23A-27168	Model 2D2520B
	Knob	5B-23806-A93	Channel Selector
	Knob	5B-23807-A93	Fine tuning
	Knob	5B-23808-A93	Contrast
	Knob	5B-23809-A93	On-off-volume
	Knob	5B-23810-A93	Control (8 used)
	Safety Glass	30M-25276	

TRUETONE
MODEL 2D2520A,B



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern. Adjust the controls for a normal picture. Set the horizontal hold control at the center of its range.

Short the horizontal phase coil (L17) by connecting a clip lead across it. Adjust the horizontal frequency coil slug (B1) until the picture synchronizes horizontally. Set the slug in the center of the range in which the picture remains in sync.

Remove the clip lead from across L17 and connect the vertical amplifier of an oscilloscope thru a 10MMF capacitor to point Ⓒ. Low side to chassis. Adjust the horizontal phase slug (B2) for waveform shown in Fig. 4. The round peak and the sharp peak must be of equal amplitude. Keep the picture in sync during this adjustment with the horizontal hold control and B1.

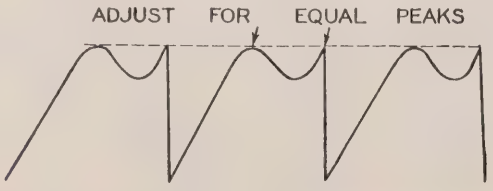


FIG. 4

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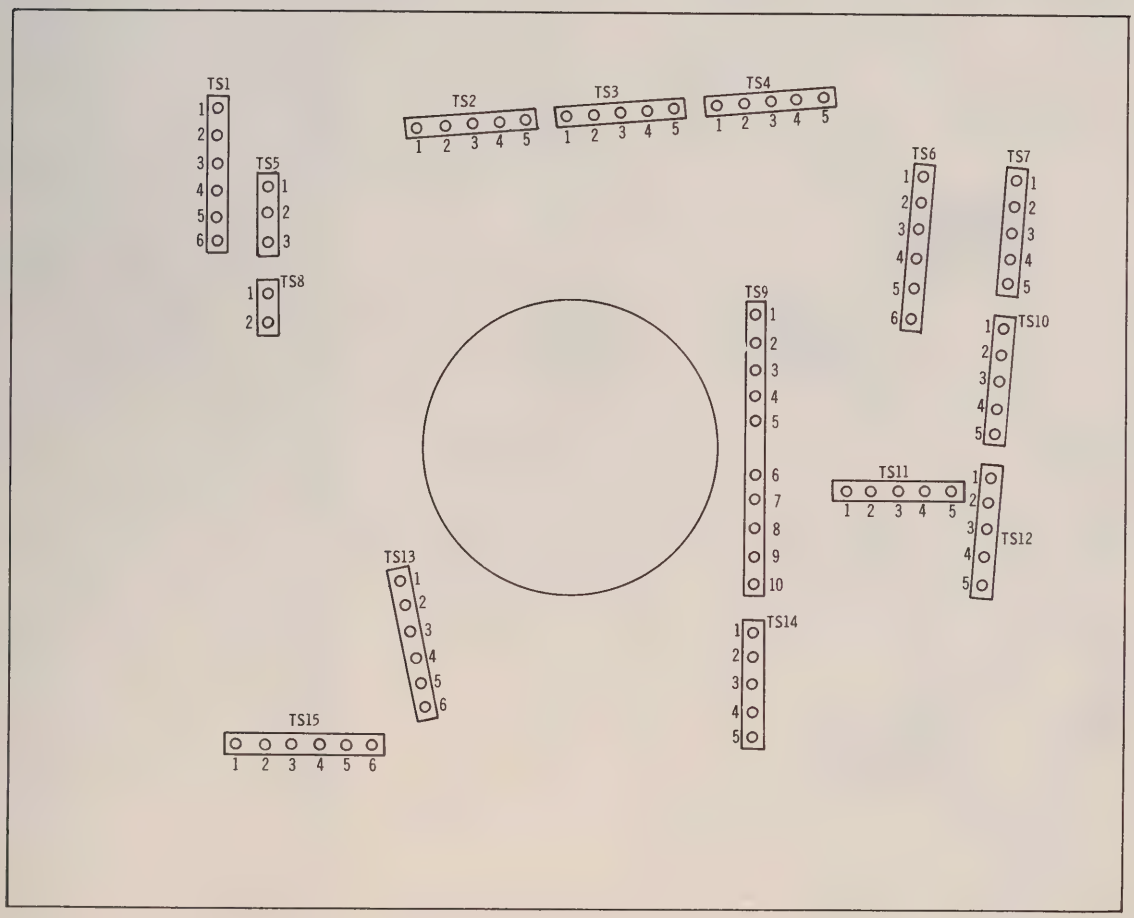


TERMINAL LOCATION CHART

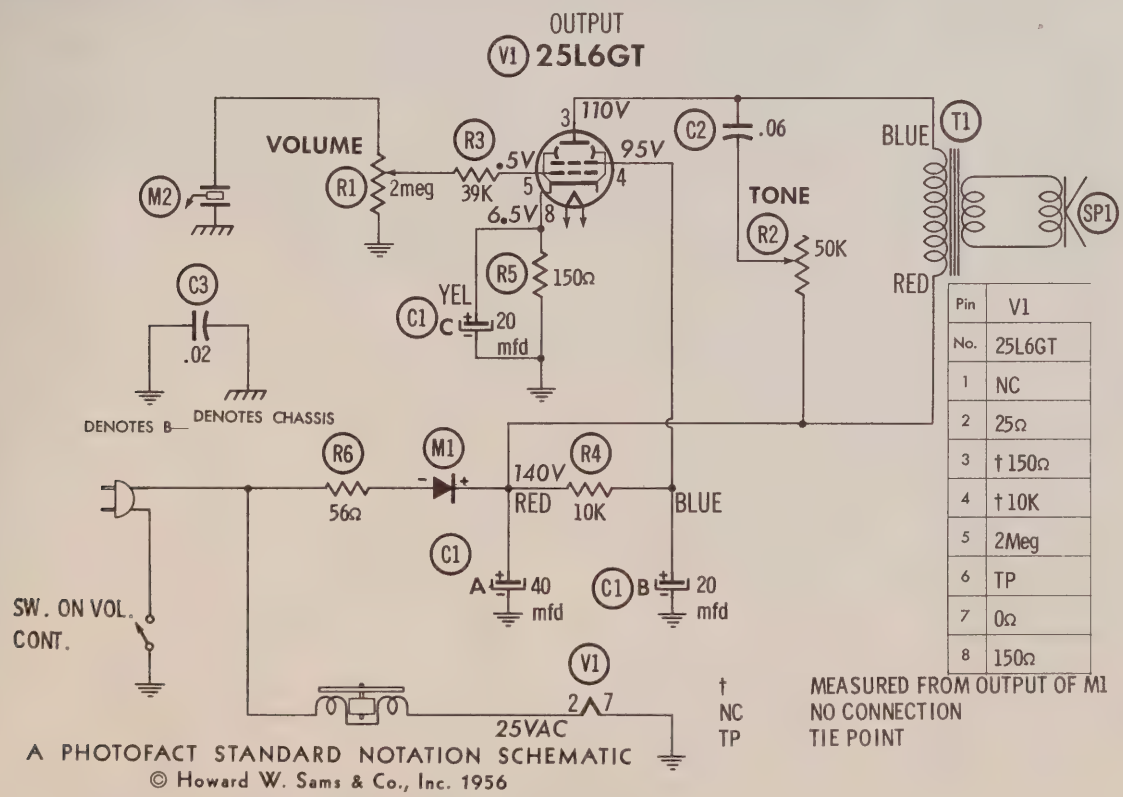
ZENITH MODELS YP6B, YP6F

PROPERTY OF
L. F. BLANKENSHIP
[illegible] MEADE ST.
DENVER, COLORADO

ZENITH MODELS YP6B, YP6F

ZENITH MODELS YP6B, YP6F

TRADE NAME	Zenith Model YP6B, YP6F
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Ill.
TYPE SET	AC Operated Phono Amplifier With 4 Speed Manual Record Player
TUBES (One)	Type 25L6GT Output
POWER SUPPLY	110-120 Volts AC - 60 Cycles RATING .40 Amp. @ 117 Volts AC



Pin No.	V1 25L6GT
1	NC
2	25Ω
3	† 150Ω
4	† 10K
5	2Meg
6	TP
7	0Ω
8	150Ω

† MEASURED FROM OUTPUT OF M1
NC NO CONNECTION
TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Output	25L6GT	

ITEM No.	USE	TYPE	NOTES

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	40	150	WC11747	PRS150/25V	BBRT4215C	TCT3114	TML-2	FMT-321	TVA-3423
B	20	150		4020/20					
C	20	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.06	200	WC11509	P688N-06		CUB6S6		PT616	6TM-S6	
C3	.02	200	WC11508	BPD-02	DD-203	CUB2S2	817-02	PT412	2TM-S2	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	2Meg	½	11748					Volume & Switch
R2	50K	½	11749					Tone

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R3	39K			BTS-39K	
R4	10K			BTS-10K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R5	150Ω			BTS-150	
R6	56Ω			BTS-56	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1980Ω	3-4Ω	Part of speaker WC11752	Z1101	A-3025	A-3332	26S58	S-12X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	QUAM PART No.	RCA TYPE No.	
SP1	4"	PM	3-4Ω	W11752	4A07	223S1	

SELENIUM RECTIFIER

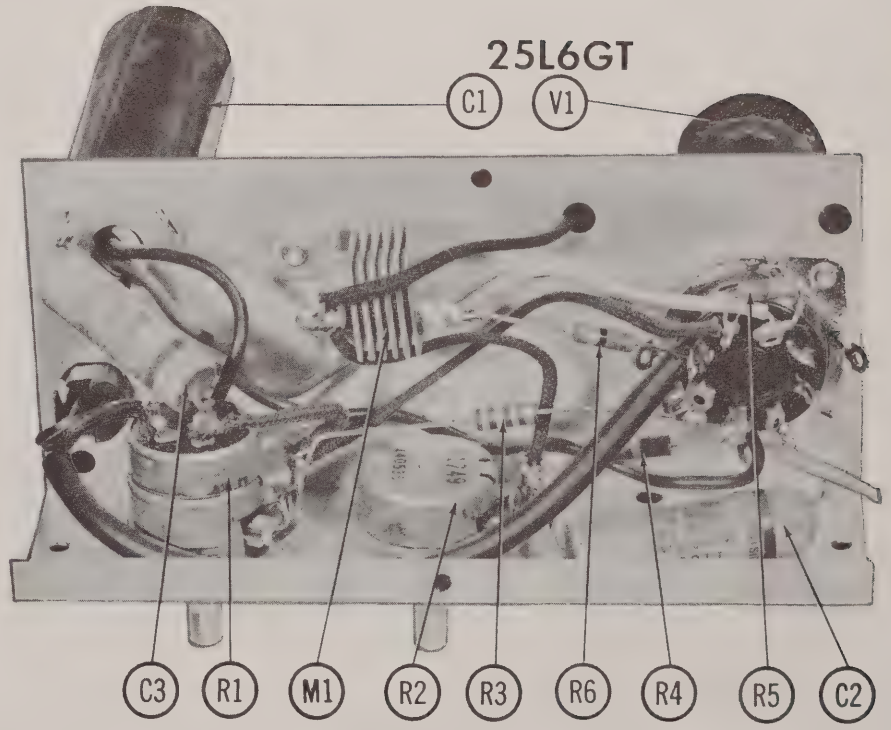
ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	ZENITH PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.044A	WC11756	1386	RS065Q	6S65	8J1	65	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	ZENITH PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M2	142-81	66-TS	K and K-78			

ASTATIC NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

CHASSIS—TOP VIEW



PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	ZENITH PART No.	JENSEN PART No.	WALCO PART No.	
M3	56-353 (16 2/3-33 1/3-45 Needle)	*A-76LP or †A-67LP or ♦A-67LPD	*W-39MGA	* Metal † Jewel ♦ Diamond
	56-354 (78 Needle)	*A-76 or †A-67 or ♦A-67D	*W-39A	

PROPERTY OF
BLANKENSHIP

ZENITH MODELS Z400, Z402, Z404 (Ch. 4Z40, 4Z41)

ZENITH MODELS Z400, Z402, Z404 (Ch. 4Z40, 4Z41)

TRADE NAME	Zenith Models Z400B, L, V, Z402F, R, Y (Ch. 4Z40), Z404L (Ch. 4Z41)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Ill.
TYPE SET	Three Power Portable AM Receiver
TUBES (Four)	Types 1R5 Converter, 1U4 IF Amplifier, 1U5 Det-AVC-AF Amp., 3V4 Output
POWER SUPPLY	110-120 Volts AC-DC (or) 7. 5 Volts "A" Supply & 90 Volts "B" Supply
RATING	. 12 Amp. @ 117 Volts AC (or) 50MA @ 7. 5 Volts DC & 13. 5MA @ 90 Volts DC
TUNING RANGE—BROADCAST	535KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use battery power, if possible. If AC power is used, use an isolation transformer when available. If not, connect a . 1MFD capacitor in series with low side of the signal generator and B-.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	. 5MFD	High side to pin 6 (grid) of 1R5 (V1). Low side to B-.	455KC (400∿ Mod)	600KC	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.		Loop	1600KC	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	1400KC	"	A6	"

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PARTS LIST AND DESCRIPTIONS

ZENITH MODEL Z400B

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	1R5	
V2	IF Amplifier	1U4	
V3	Det-AVC-AF Amp.	1U5	
V4	Output	3V4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■80	150	22-2886 (Note 1)						R2313*
B	▲60	150							
C	200	10							

Note 1: Mfgr. part no. 22-2446 used with audio output transformer part no. 95-1496.
* Non catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.022	200	22-2804	BPD-02	DF-203	CUB4S22	817-02	PT4122	2TM-S22	
C3	100		22-5	DI-0001	DD-101	G042	801-101	UC-531	5GA-T1	
C4	4700		22-4	BPD-0047	DD-472	K079	811-0047	UC-5247	5HK-D47	
C5	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C6	100		22-5	DI-001	DD-101	G042	801-101	UC-531	5GA-T1	
C7	4700		22-4	BPD-0047	DD-472	K079	811-0047	UC-5247	5HK-D47	
C8	4700		22-4	BPD-0047	DD-472	K079	811-0047	UC-5247	5HK-D47	
C9	4700		22-4	BPD-0047	DD-472	K079	811-0047	UC-5247	5HK-D47	
C10	.1	200	22-2980	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C11	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C12	.047	200	22-2792	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	63-3615		A47-1Meg-S			Volume
B	Shaft		Not Req.		FS-3			Attach to R1A
C	Switch		Not Req.		SWE-20			Attach to R1A

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

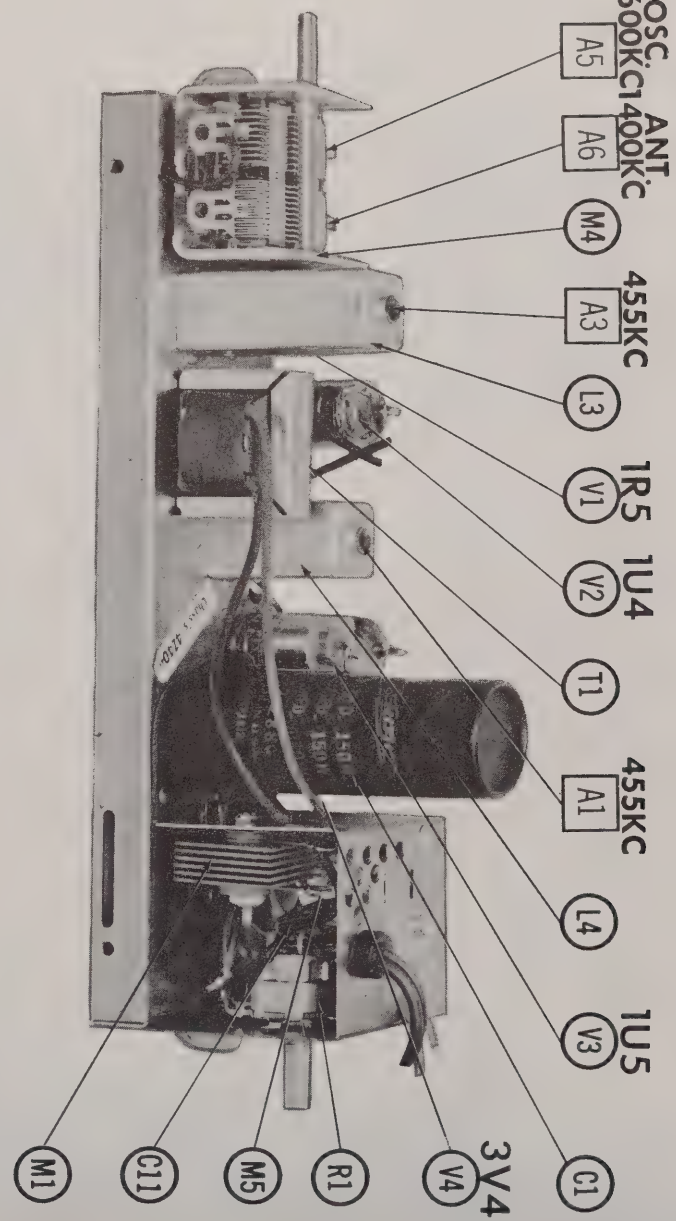
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R2	100K			BTS-100K	
R3	3900Ω			BTS-3900	
R4	4.7Meg			BTS-4.7Meg	
R5	390K			BTS-390K	
R6	180Ω			BTS-180	
R7	4.7Meg			BTS-4.7Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R8	1Meg			BTS-1Meg	
R9	4.7Meg			BTS-4.7Meg	
R10	680Ω			BTS-680	
R11	2.2Meg			BTS-2.2Meg	
R12	680Ω			BTS-680	
R13	1750Ω	5	63-3259	1 3/4A-1750	
R14	180Ω	4	63-2821	PW4-200	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	9400Ω	3-4Ω	95-1485 95-1496 ②		A-2927①	A-3329 ①	24S49 ①	S-11X ①	① Use original channel. ② Alternate part no.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	QUAM PART No.	RCA TYPE No.	
SP1	4"	PM	3-4Ω	49-799	4A07	223S1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Stick	.8Ω		S-24314				
L2	Osc. Coil	1.4Ω	6.2Ω	S-24403				
L3	Input IF	24Ω	24Ω	95-1422	16-6780		13-PC1	
L4	Output IF	28Ω	28Ω	95-1484				

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	ZENITH PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.062A	212-5	1003A	RS075	6S75	5M4	75	

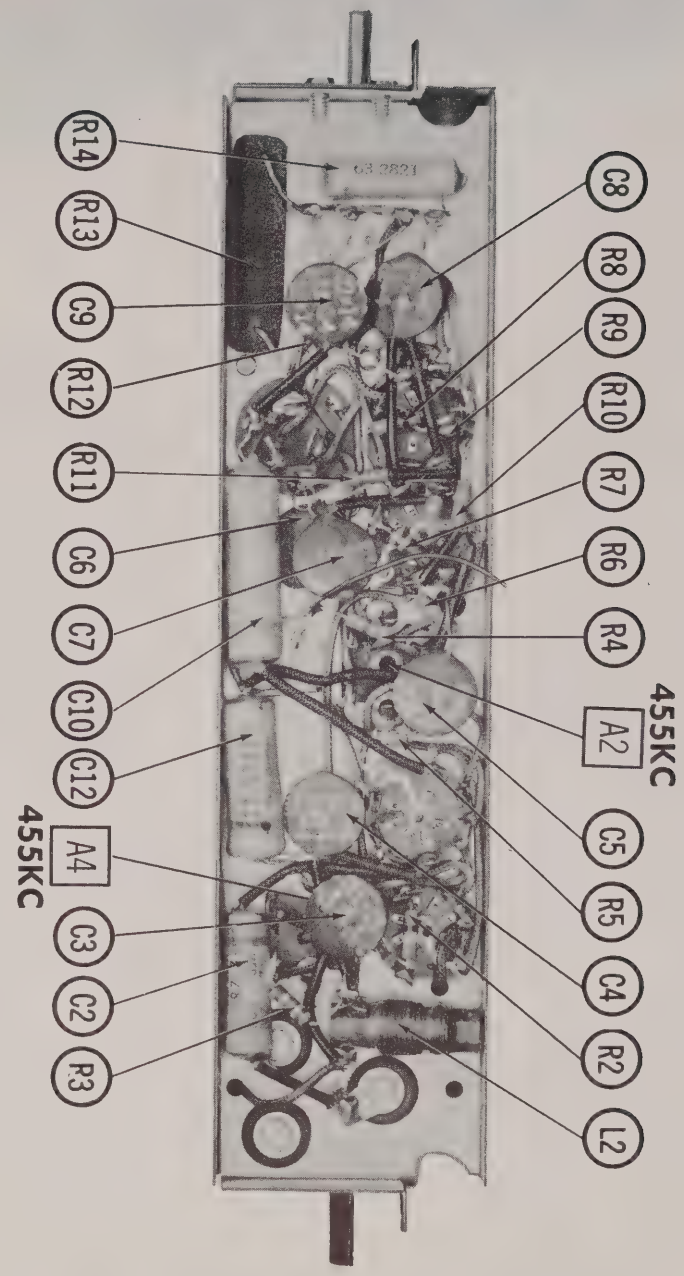
BATTERIES

ITEM No.	VOLTAGE	ZENITH PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2	7.5V "A"	Z750	717			C5			
M3	90V "B"	Z90		479			P60		

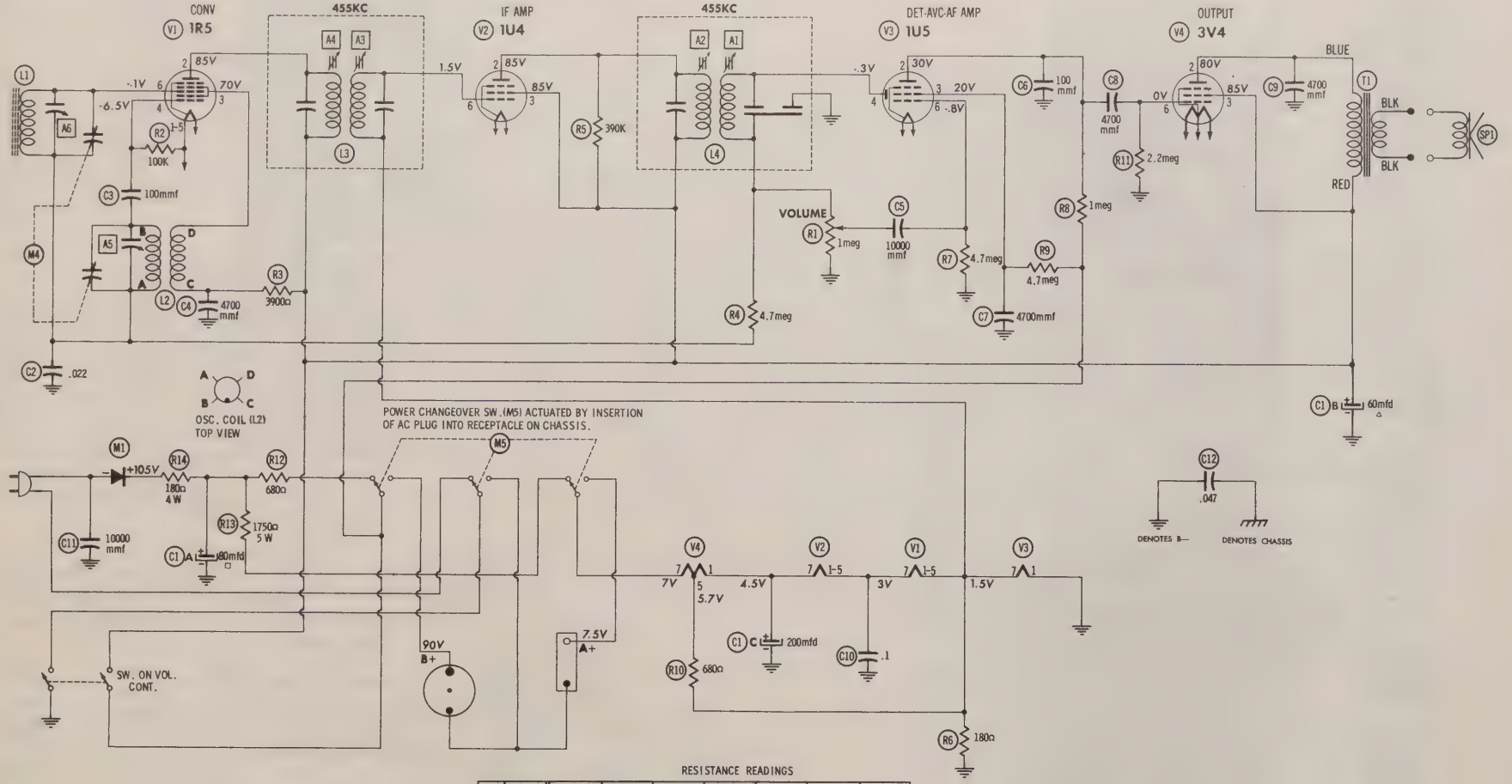
MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M4	Tuning Cap.	22-2736	2 Gang (21-325MMF;19-135MMF)
M5	Switch	85-575	Power Changeover (3 Pole - 2 Position. Rotary, Wafer type)
	Cabinet	14-1990	Front, Model Z400V
	Cabinet	14-1991	Front, Model Z400L
	Cabinet	14-1992	Front, Model Z400B
	Cabinet	14-1994	Rear, Model Z400V
	Cabinet	14-1995	Rear, Model Z400L
	Cabinet	14-1996	Rear, Model Z400B
	Cabinet	14-1999	Front, Model Z402R
	Cabinet	14-2000	Front, Model Z402Y
	Cabinet	14-2001	Front, Model Z402F
	Cabinet	14-2010	Rear, Model Z402R
	Cabinet	14-2011	Rear, Model Z402Y
	Cabinet	14-2012	Rear, Model Z402F
	Cabinet	14-2027	Model Z404L
	Handle	36-135	Cabinet (Top Half) - Models Z400L, V, B.
	Handle	36-139	Cabinet (Bottom Half) - Models Z400L, V, B.
	Handle	36-136	Cabinet (Top Half) - Model Z402R.
	Handle	36-137	Cabinet (Top Half) - Model Z402Y
	Handle	36-138	Cabinet (Top Half) - Model Z402F
	Handle	36-140	Cabinet (Bottom Half) - Model Z402R.
	Handle	36-141	Cabinet (Bottom Half) - Model Z402Y.
	Handle	36-142	Cabinet (Bottom Half) - Model Z402F.
	Knob	46-1513	Dial, Model Z400V.
	Knob	46-1514	Dial, Model Z400L.
	Knob	46-1515	Dial, Model Z400B.
	Knob	46-1516	Dial, Model Z402R.
	Knob	46-1533	Dial, Model Z402Y
	Knob	46-1534	Dial, Model Z402F
	Knob	46-1517	On-Off-Volume, Model Z400V.
	Knob	46-1518	On-Off-Volume, Model Z400L.
	Knob	46-1519	On-Off-Volume, Model Z400B.
	Knob	46-1520	On-Off-Volume, Model Z402R.
	Knob	46-1535	On-Off-Volume, Model Z402Y.
	Knob	46-1536	On-Off-Volume, Model Z402F.
	Knob	46-1565	On-Off-Volume, Model Z404L.
	Knob	46-1564	Tuning

CHASSIS—BOTTOM VIEW



ZENITH MODEL Z400B



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	1R5	•	†850Ω	†4500Ω	100K	•	6Meg	•
V2	1U4	•	†850Ω	†850Ω	TP	•	35Ω	•
V3	1U5	•	†1Meg	†4.7Meg	1Meg	TP	4.7Meg	•
V4	3V4	•	†1300Ω	†850Ω	TP	•	2.2Meg	•

* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.
† MEASURED FROM OUTPUT OF M1.
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

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ZENITH MODEL Z2222C

TRADE NAME	Zenith	MODELS	CHASSIS
		Z2220R, RU, Y, YU	17Z20, U
		Z2222C, CU, E, EU, R, RU, Y, YU	17Z21, U
		Z2247E, EU, H, HU, R, RU, Z2258E, EU, H, HU, R, RU, Z2282E, EU, R, RU	17Z22, U
		Z2637E, EU, R, RU, Y, YU, Z2672E, EU, R, RU	17Z23, U
		Z3000E, EU, R, RU, Z3004E, EU, R, RU, Z3006E, EU, R, RU, Z3008E, EU, R, RU	17Z22Q, U
		Z4000E, EU, R, RU	17Z23Q, U
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Illinois		
TYPE SET	Television Receiver		
TUBES	Seventeen		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.46A @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

INDEX

Alignment Instructions 6, 7, 8
Disassembly Instructions 1
Horizontal Sweep Circuit Adjustments 20
Parts List and Descriptions 14, 15, 16
Photographs
- Cabinet-Rear View 20
- Capacitor & Alignment Identification 3, 10
- Chassis-Top View 5
- RF Tuner 13
- Resistor & Inductor Identification 4, 9

Resistance Measurements 18
Servicing in the Field 1
Schematic (Alternate Tuners) 8, 12, 17
Schematic (TV) 2
Terminal Location Chart 19
Tube Failure Check Chart 11
Tube Placement Chart (Bottom View) 18
Tube Placement Chart (Top View) 11

ZENITH MODELS Z2220R, RU, Y, YU, Z2222C, CU, E, EU, R, RU, Y, YU, Z2247E, EU, H, HU, R, RU, Z2258E, EU, H, HU, R, RU, Z2282E, EU, Z2637E, EU, R, RU, Y, YU, Z2672E, EU, R, RU, Z3000E, EU, R, RU, Z3004E, EU, R, RU, Z3006E, EU, R, RU, Z3008E, EU, R, RU, Z4000E, EU, R, RU (Ch. 17Z20, 17Z21, 17Z22, 17Z22Q, 17Z23, 17Z23Q)

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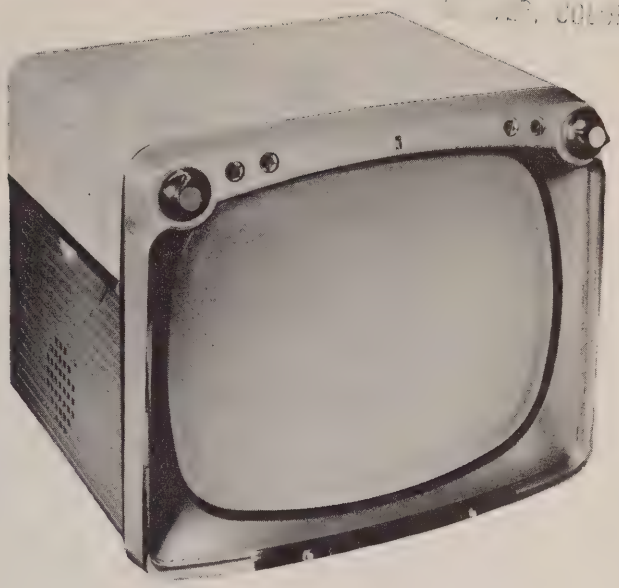

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 8 metal screws. Remove rear cover.
2. Remove 5 metal screws holding chassis brackets to rear of cabinet.
3. Disconnect speaker leads.
4. Slide chassis from front of cabinet.
5. Remove 2 speaker nuts. Remove speaker.

MODEL	CHASSIS
Z2222C	17Z20

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF tuner oscillator circuit may be accomplished one at a time thru a hole in rear cover below and to the right of the fine tuning shaft.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 2 metal screws holding name plate at the bottom edge of the safety glass. Remove name plate and safety glass. Use extreme caution when removing safety glass.

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 11.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjust the horizontal hold until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

Adjust the buzz control (R7) located on tube side of chassis for maximum volume and MINIMUM buzz.

FUSES

One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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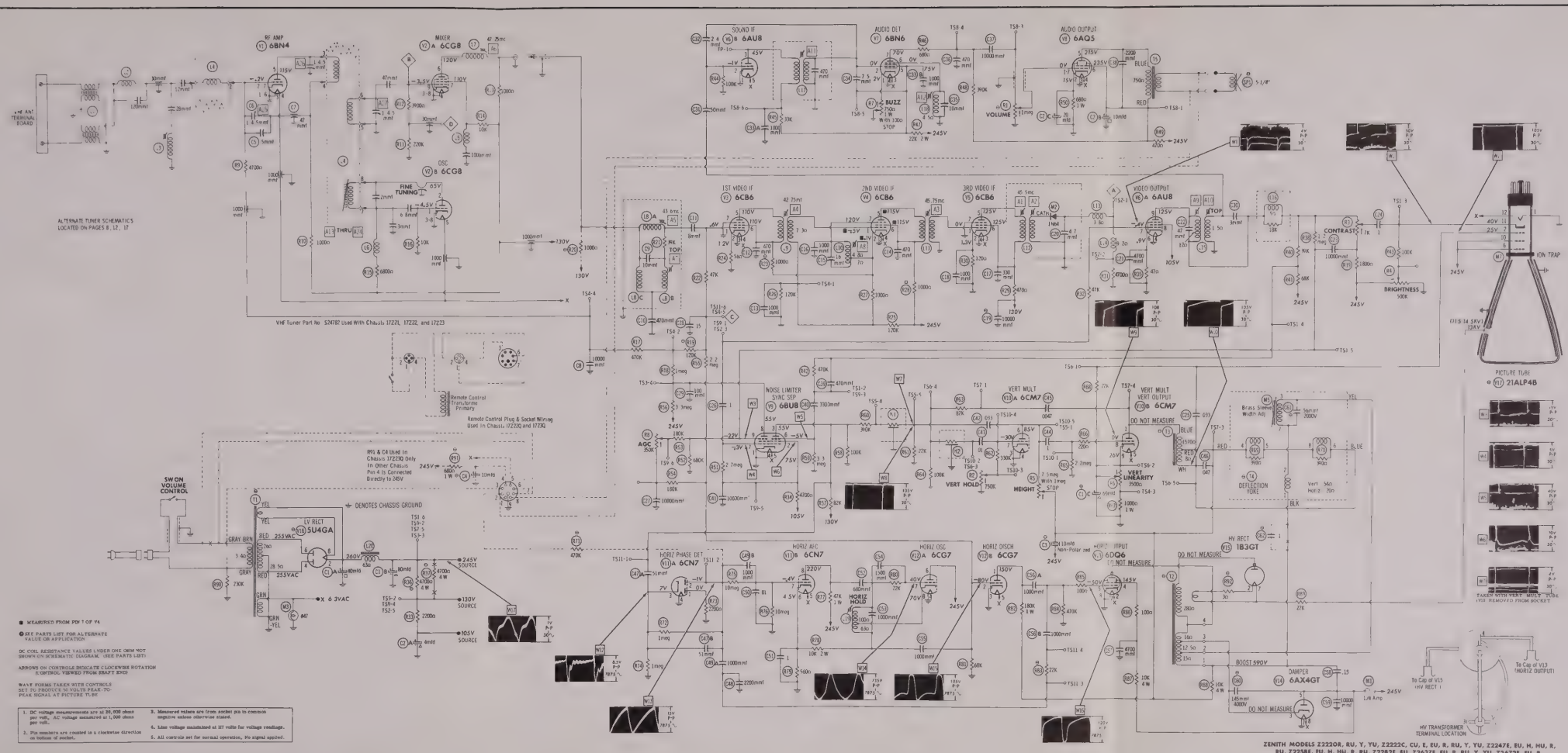
RF AMP V1 6BN4
MIXER V7A 6CG8
OSC V7B 6CG8
FINE TUNING
THRU
ANT TERMINAL BOARD
ALTERNATE TUNER SCHEMATICS LOCATED ON PAGES 8, 12, 17
VHF Tuner Part No 524782 Used With Chassis 17Z2L, 17Z22, and 17Z23
Remote Control Transformer Primary
Remote Control Plug & Socket Wiring Used in Chassis 17Z22Q and 17Z3Q
R91 & C4 Used In Chassis 17Z23Q Only In Other Chassis Pin 4 Is Connected Directly to 245V
SW ON VOLUME CONTROL
DENOTES CHASSIS GROUND
1V RECT 5U4GA V18
253VAC
260V
63Ω
6.3VAC
245V SOURCE
130V SOURCE
105V SOURCE
SOUND IF V5B 6AU8
AUDIO DET V6 6BN6
AUDIO OUTPUT V8 6AQ5
BUZZ
VOLUME
1ST VIDEO IF V2 6CB6
2ND VIDEO IF V4 6CB6
3RD VIDEO IF V3 6CB6
VIDEO OUTPUT V6A 6AU8
CONTRAST
BRIGHTNESS
ION TRAP
PICTURE TUBE V17 21ALP4B
NOISE LIMITER SYNC SEP V9 6BU8
AGC
VERT HOLD
VERT MULT V10A 6CM7
VERT MULT VERT OUTPUT V10B 6CM7
DO NOT MEASURE
HEIGHT
VERT LINEARITY
DEFLECTION YOKE
Brass Sleeve Width Adj
Vert Size
Horiz Size
HORIZ PHASE DET V11A 6CN7
HORIZ AFC V11B 6CN7
HORIZ OSC V12A 6CG7
HORIZ DISCH V12B 6CG7
HORIZ HOLD
HORIZ OUTPUT V13 6DQ6
HV RECT V15 1B3GT
BOOST 590V
DAMPER V14 6AX4GT
145V 4000V
1.4V Amp
To Cap of V15 HV RECT
To Cap of V13 HORIZ OUTPUT
HV TRANSFORMER TERMINAL LOCATION
FARES WITH PART 3 MUST BE REMOVED FROM SOCKET
MEASURED FROM PIN 7 OF V4
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 90 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements are at 20,000 ohms per volt. AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation, No signal applied.

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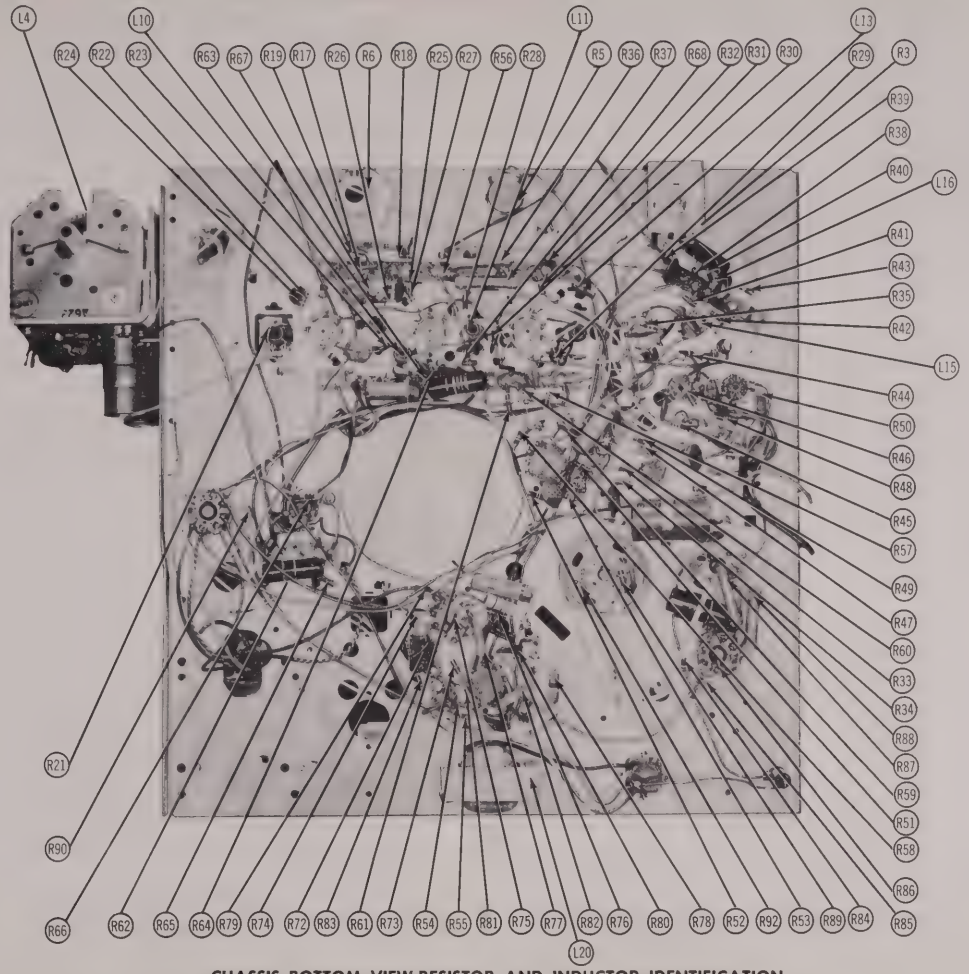
ZENITH MODELS Z2220R, RU, Y, YU, Z2323C CU, E EU, R, RU, Y, YU, Z2247E, EU, H, HU, R, RU, Z2258E, EU, H, HU, R, RU, Z2282E, EU, Z2637E, EU, R, RU, Y, YU, Z2672E, EU, R, RU, Z3000E, EU, R, RU, Z3004E, EU, R, RU, Z3006E, EU, R, RU, Z4000E, EU, R, RU (Ch. 17Z2O, 17Z21, 17Z22, 17Z22Q, 17Z23, 17Z23Q)



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

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CHASSIS TOP VIEW

TP1 45V AUDIO DET. PLATE

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS--READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis.
Do not remove the horizontal multifibrator tube (V12) to disable the high voltage

VIDEO IF ALIGNMENT

Remove the Mixer-Oscillator tube (V3) from its socket and connect a wire to the grid (pin 1 on 6CG8 or pin 9 of 6U8). Replace the tube back in its socket. Connect a clip lead from the loose end of the wire to the chassis.
Connect the negative lead of a 6 volt battery or low impedance bias supply to point ⊖ Connect the positive lead to chassis

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	470MMF	High side to point ⊕. Low side to chassis	Not used	48.5MC (Unmod)	Any	USE VTVM. DC probe to point ⊕ thru 10K resistor. Common to chassis.	A1, A3	Use only enough generator output to provide usable indication on VTVM. Adjust for maximum indication on VTVM.
2.	"	"	"	45.75MC	"	"	A3	"
3.	"	"	"	43.75MC	"	"	A4	"
4.	"	"	"	43.5MC	"	"	A5, A6	"
5.	"	"	"	47.25MC	"	"	A7	Increase generator output for usable indication on VTVM. Adjust A7 for MINIMUM deflection. Repeat steps 1 thru 5.
6.	"	"	43MC (00MC Swp)	40.50MC 41.25MC 42.75MC 45.0MC 45.75MC 47.25MC	"	Vert. Amp. thru 10K to point ⊕. Low side to chassis.	A8	Check for response similar to Fig. 1. If necessary, retouch A1 thru A6 to obtain desired response. Adjust A8 for maximum displacement of 40.50MC marker, but not to exceed displacement of 41.25MC marker. Adjust A5 for maximum amplitude of response curve and position of the 45.75MC marker. Adjust A4 for position of 42.75MC marker. A1 and A3 affect the bandwidth. A5 and A6 affect the top portion of the curve. Increase sweep generator output and check the position of the 47.25MC marker. If necessary, SLIGHTLY retouch A7 for correct position of 47.25MC marker. The 41.25MC marker should be in proper position on curve after correct bandpass and other marker positions are obtained. Remove wire from oscillator tube. Disconnect bias battery.

SOUND IF ALIGNMENT

Connect an attenuator (Zenith #6-17303 or equivalent) in series with the receiving antenna. Tune in a modulated TV signal and adjust the attenuator until the signal falls below the limiting level of the 6BN6 (audio - detector) as evidenced by a bias similar to super-regeneration. Adjust A9, A10, A11 and A13 for maximum sound of best quality. Adjust the bias control (R7) for minimum intercarrier buzz. If during sound IF alignment, the signal rises above the limiting level of the 6BN6 (hiss disappears) increase attenuation until the hiss reappears.

VHF OSCILLATOR ALIGNMENT FOR TUNERS #8-24782 AND #8-24783.

Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point ⊕. Low side to chassis.	A13	Adjust to place sound marker in trap notch as in Fig. 2. Video marker should fall at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A14	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A15	
			193MC (10MC Swp)	193.25MC 197.75MC	10		A16	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A17	
			183MC (00MC Swp)	181.25MC 185.75MC	8		A18	
			177MC (00MC Swp)	175.25MC 179.75MC	7		A19	
			85MC (00MC Swp)	83.25MC 87.75MC	6		A20	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A21	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A22	
			63MC (00MC Swp)	61.25MC 65.75MC	3		A23	
			57MC (00MC Swp)	55.25MC 59.75MC	2		A24	

VHF RF AND MIXER ALIGNMENT FOR TUNERS #8-24782 AND #8-24783

Connect the negative lead of a 2 volt bias supply to the junction of C8 and R17.
Connect the positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	13	Vert. Amp. thru 10K to point ⊕. Low side to chassis.	A25, A26 A27,	Adjust for response curve similar to Fig. 3 with markers above 90%. Adjust RF coil (L4) for maximum amplitude of response curve,
9.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 3. If markers fall below 70% on any channel, make compromise adjustments of A25, A26 and A27 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected. Adjust RF coil (L4) for maximum amplitude of response curve on each channel.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			193MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (00MC Swp)	181.25MC 185.75MC	8			
			177MC (00MC Swp)	175.25MC 179.75MC	7			
			85MC (00MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (00MC Swp)	61.25MC 65.75MC	3			
			57MC (00MC Swp)	55.25MC 59.75MC	2			

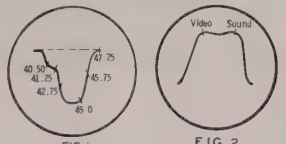


FIG. 1

FIG. 2

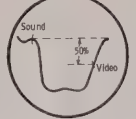
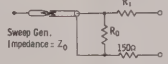


FIG. 3



Z_0	R_0	R_1
50Ω	50Ω	120Ω
75Ω	82Ω	110Ω
92Ω	110Ω	100Ω

FIG 4

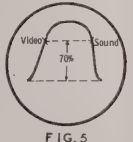


FIG. 5

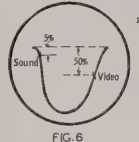


FIG. 6

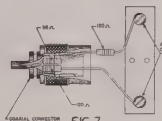


FIG. 7

VHF RF AND MIXER ALIGNMENT FOR TUNERS #8-24672 AND #8-24673

Connect the negative lead of a 2 volt bias supply to the junction of C8 and R17. Connect the positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Fig. 4	Across antenna terminals thru matching network (Fig. 4).	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point ⊕. Low side to chassis.	A28, A29	Check for response similar to Fig. 5. If necessary, adjust A28 by expanding or compressing coil turns for proper bandwidth. Adjust A29 by expanding or compressing coil turns for maximum amplitude of response curve.
11.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"	A30	Check for response curve similar to Fig. 5. If necessary, adjust by bending loop in or out from switch rotor for proper response
12.	"	"	201MC (10MC Swp)	199.25MC 203.75MC	11	"	A31	"
13.	"	"	195MC (10MC Swp)	193.25MC 197.75MC	10	"	A32	"
14.	"	"	189MC (10MC Swp)	187.25MC 191.75MC	9	"	A33	"
15.	"	"	183MC (10MC Swp)	181.25MC 185.75MC	8	"	A34	"
16.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7	"	A35	"
17.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A36, A37, A38	Adjust A37 and A38 for correct bandpass. Adjust A36 for maximum amplitude similar to Fig. 5. A36, A37 and A38 are adjusted by expanding and compressing coil turns.
18.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A39, A40	Adjust by expanding or compressing coil turns for response similar to Fig. 5.
19.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"	A41, A42	"
20	"	"	63MC (00MC Swp)	61.25MC 65.75MC	3	"	A43, A44	"
21.	"	"	57MC (00MC Swp)	55.25MC 59.75MC	2	"	A45, A46	"

VHF OSCILLATOR ALIGNMENT FOR TUNERS #8-24672 AND #8-24673

Connect the bias as under "Video IF Alignment". Turn the fine tuning control until the index hole in the fine tuning cam is directly over the small hole just below the channel 13 oscillator adjustment screw.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
22.	Fig. 4	Across antenna terminals thru matching network (Fig. 4).	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point ⊕. Low side to chassis.	A47	Adjust to place sound marker in trap notch as in Fig. 6. Video marker should fall at 50%.
			207MC (00MC Swp)	205.25MC 209.75MC	12		A48	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A49	
			195MC (00MC Swp)	193.25MC 197.75MC	10		A50	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A51	
			183MC (00MC Swp)	181.25MC 185.75MC	8		A52	
			177MC (00MC Swp)	175.25MC 179.75MC	7		A53	
			85MC (00MC Swp)	83.25MC 87.75MC	6		A54	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A55	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A56	
			63MC (00MC Swp)	61.25MC 65.75MC	3		A57	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A58	

PROPERTY OF
DENNIS DALESSANDRO
1057 MEADE ST.
DENVER, COLORADO

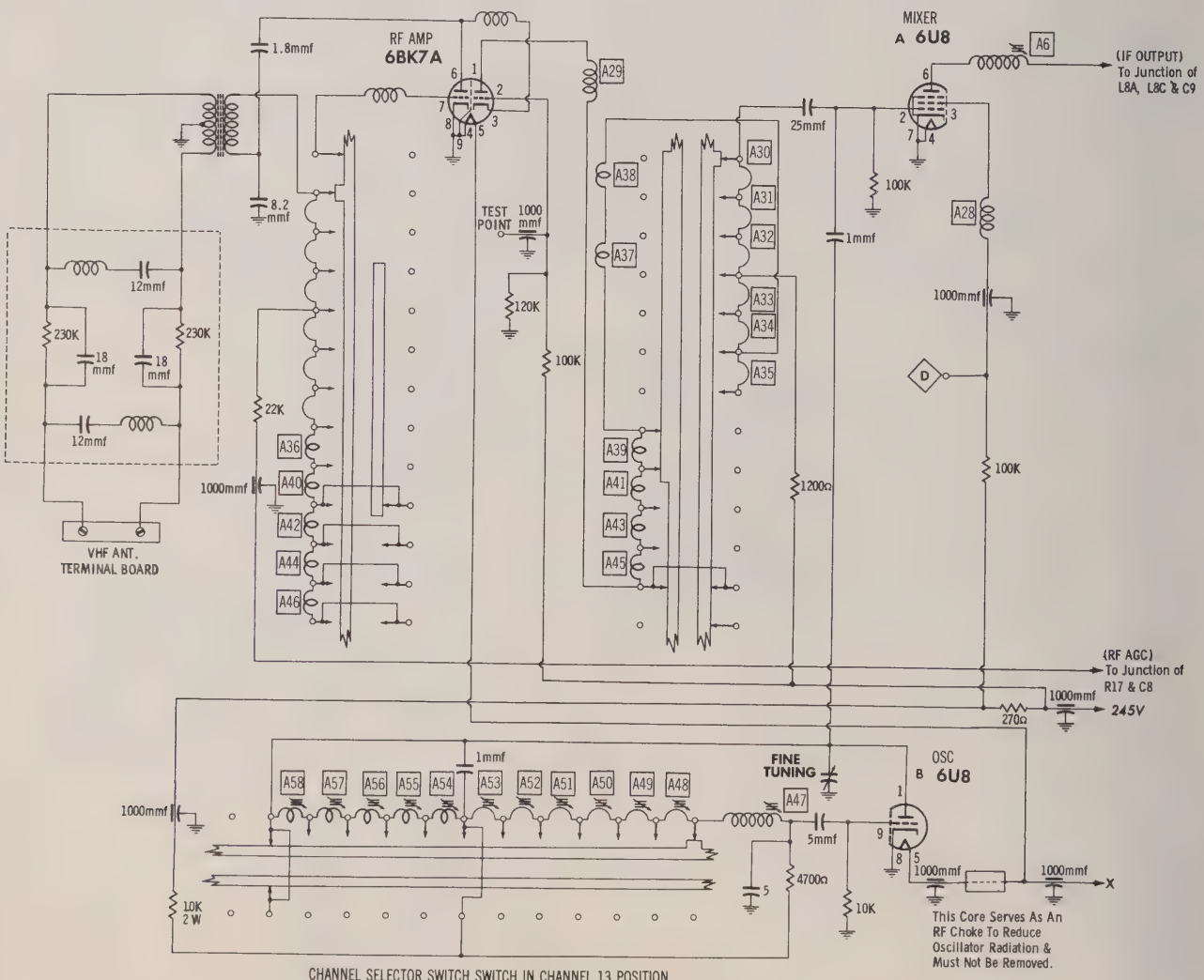
ZENITH MODELS Z22320R, RU, Y, YU, Z22322C, CU, E, EU, R, RU, Y, YU, Z22347E, EU, H, HU, R, RU, Z22585E, EU, H, HU, R, RU, Z22582E, EU, Z23637E, EU, R, RU, Y, YU, Z25672E, EU, E, RU, Z30006E, EU, E, RU, Z30066, EU, R, RU, Z30085, EU, R, RU, Z40006E, EU, R, RU (Ch. 17220, 17221, 17232, 17232Q, 17233, 17230)

ALIGNMENT INSTRUCTIONS (cont)

UHF TUNER ALIGNMENT

Alignment of the UHF tuner should not be attempted unless proper test equipment is available. Switch the receiver to the UHF position. Connect the negative lead of a 2 volt bias supply to point Ⓒ. Connect the positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
23.	Fig. 7	Across antenna terminals thru matching network. (Fig. 7).	713MC (10MC Swp)	711.25MC 715.75MC	54	Vert. Amp. thru 10K to point Ⓐ. Low side to chassis.	A59, A60, A61	Tuner rocker arm should be in the horizontal position. If necessary, loosen set screw and adjust tuner so that rocker arm is horizontal when the channel indicator is set to channel 54. Do not adjust A59 unless oscillator calibration is off more than 3 channels. If necessary, adjust A59 to place video marker at 50% on the response curve as in Fig. 6. The image (weaker response) will appear also. The response toward the counter clockwise position of A59 is the proper response. Adjust A60 and A61 for maximum amplitude of response similar to Fig. 6.
24.	"	"	473MC (10MC Swp)	471.25MC 475.75MC	14	"		Check for response similar to Fig. 6. If oscillator is off more than 3 channels, adjust the oscillator travel adjustments (osc. mixer and antenna travel adjustments are the 3 round thumb screws on top of tuner) to scale. Care must be used in making this adjustment so as not to move the rocker arm out of its bearing. Set the mixer and antenna adjustments for maximum response on scope.
25.	"	"	887MC (10MC Swp)	885.25MC 889.75MC	83	"	A62, A63, A64	Adjust A62 to place video marker at 50% as in Fig. 6. Adjust A63 and A64 for maximum amplitude and symmetry of response similar to Fig. 6.



CHANNEL SELECTOR SWITCH SWITCH IN CHANNEL 13 POSITION

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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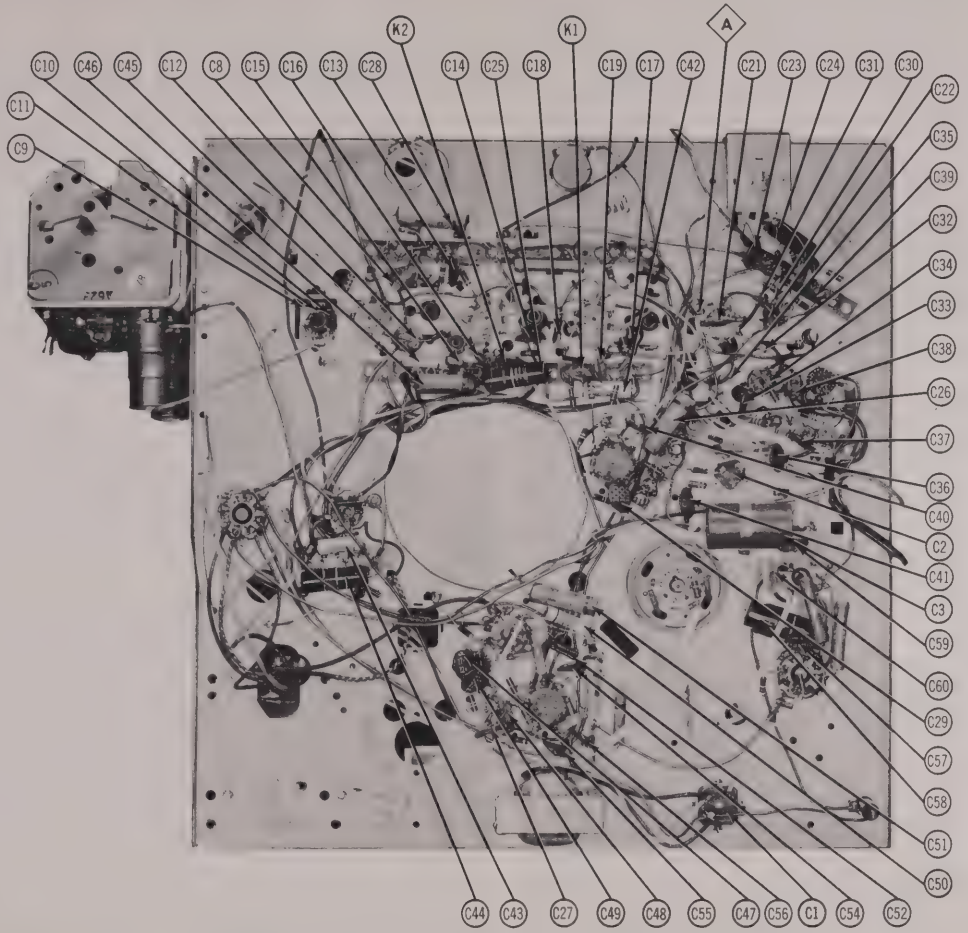
VHF Tuner Part No. S-24672 Used With Chassis 17Z20

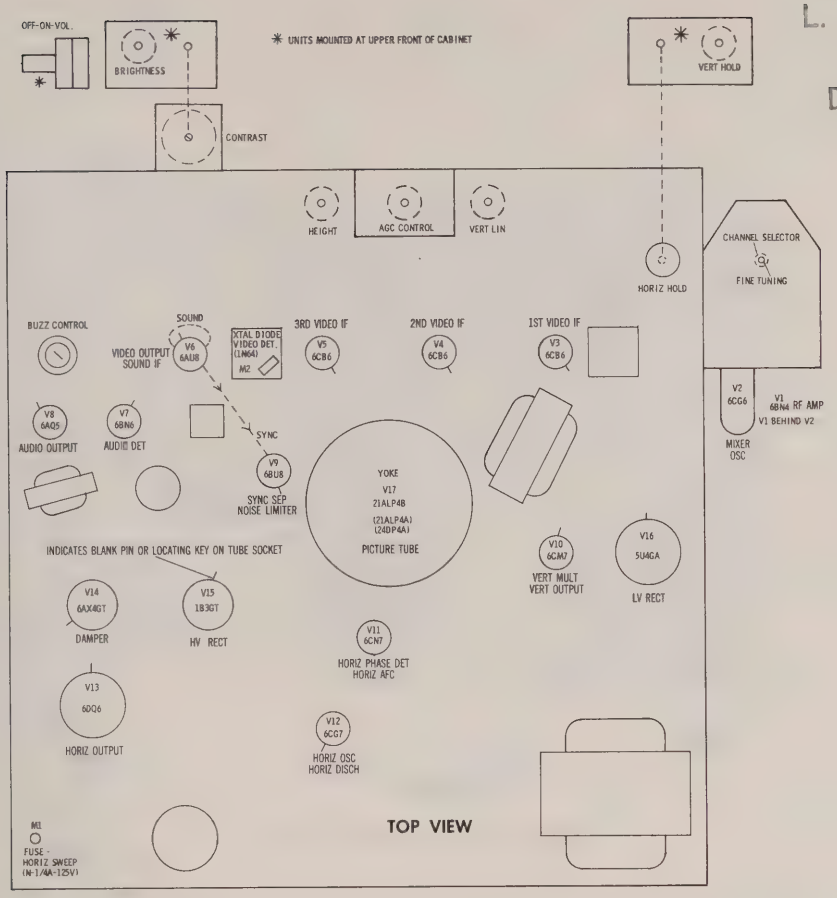
ALTERNATE VHF TUNER SCHEMATIC



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

TUBE PLACEMENT CHART

L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

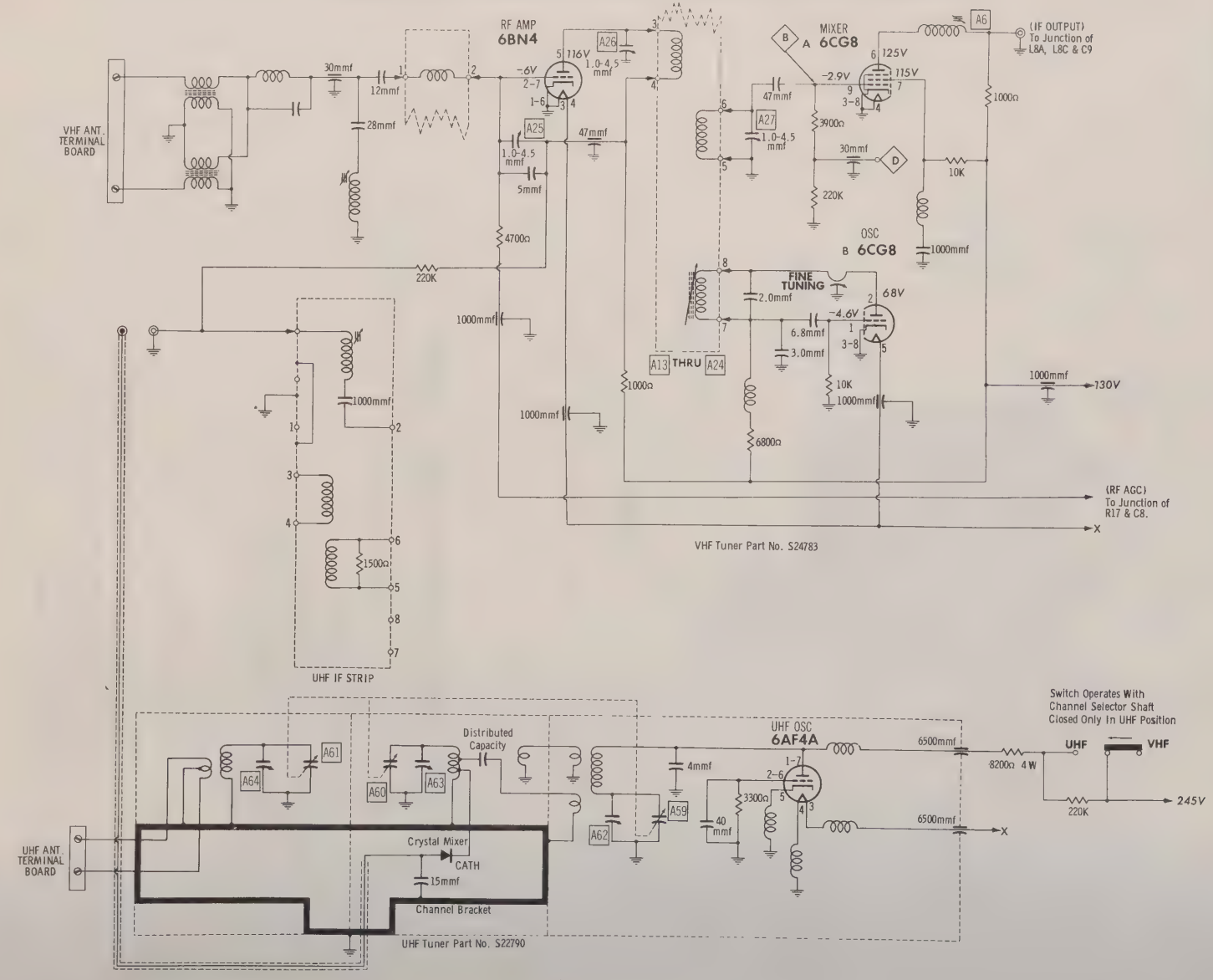
POWER SUPPLY FAILURE
No raster, no sound - V16

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V17
Has pic, no sound - V6, V7, V8
Overloaded picture - V9

SYNC FAILURE
No vert. sync - V9, V10
No horiz. sync - V9, V11, V12
No vert. or horiz. sync - V9

SWEEP FAILURE
No raster, has sound - V11, V12, V13, V14, V15, V17, Fuse (M1)
No vertical deflection - V10
Poor vert. linearity or foldover - V10
Poor horiz. linearity or foldover - V12, V13, V14
Narrow picture - V12, V13, V14, V16
Vert. off freq. - V9, V10
Horiz. off freq. - V9, V11, V12

ZENITH MODELS Z222OR, RU, Y, YU, Z2222C, CU, E, EU, R, RU, Y, YU, Z2247E, EU, H, HU, R, RU, Z2258E, EU, H, HU, R, RU, Z2282E, EU, Z2637E, EU, R, RU, Y, YU, Z2672E, EU, R, RU, Z3000E, EU, R, RU, Z3004E, EU, R, RU, Z3006E, EU, R, RU, Z3008E, EU, R, RU, Z4000E, EU, R, RU (Ch. 17Z20, 17Z21, 17Z22, 17Z22Q, 17Z23, 17Z23Q)



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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UHF-VHF Tuner Used With Chassis 17Z21U, 17Z22U, & 17Z23U

ALTERNATE VHF-UHF TUNER SCHEMATIC

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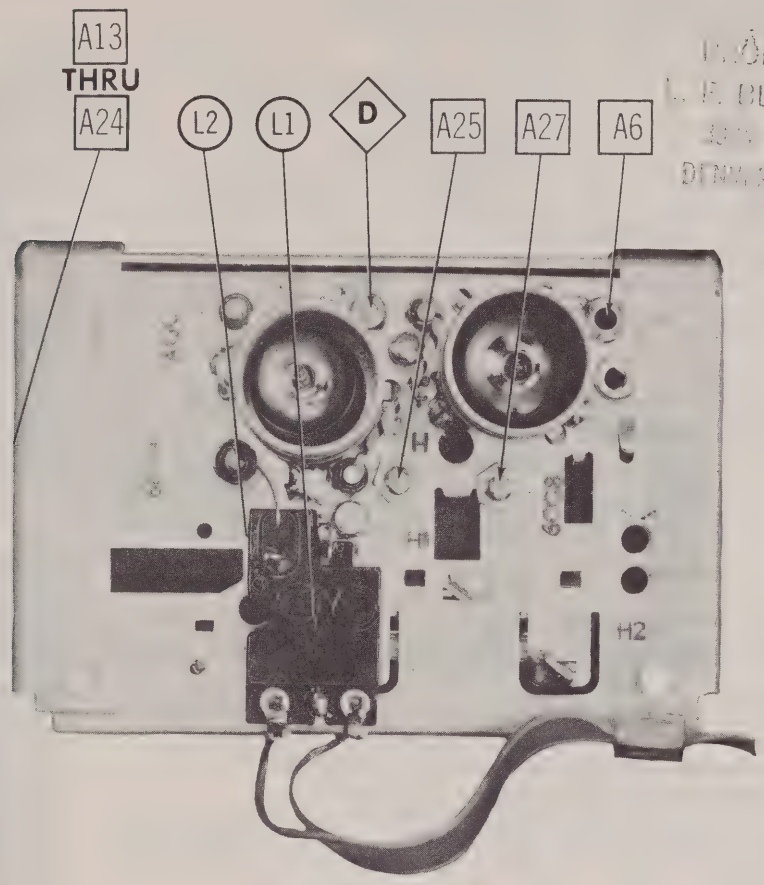
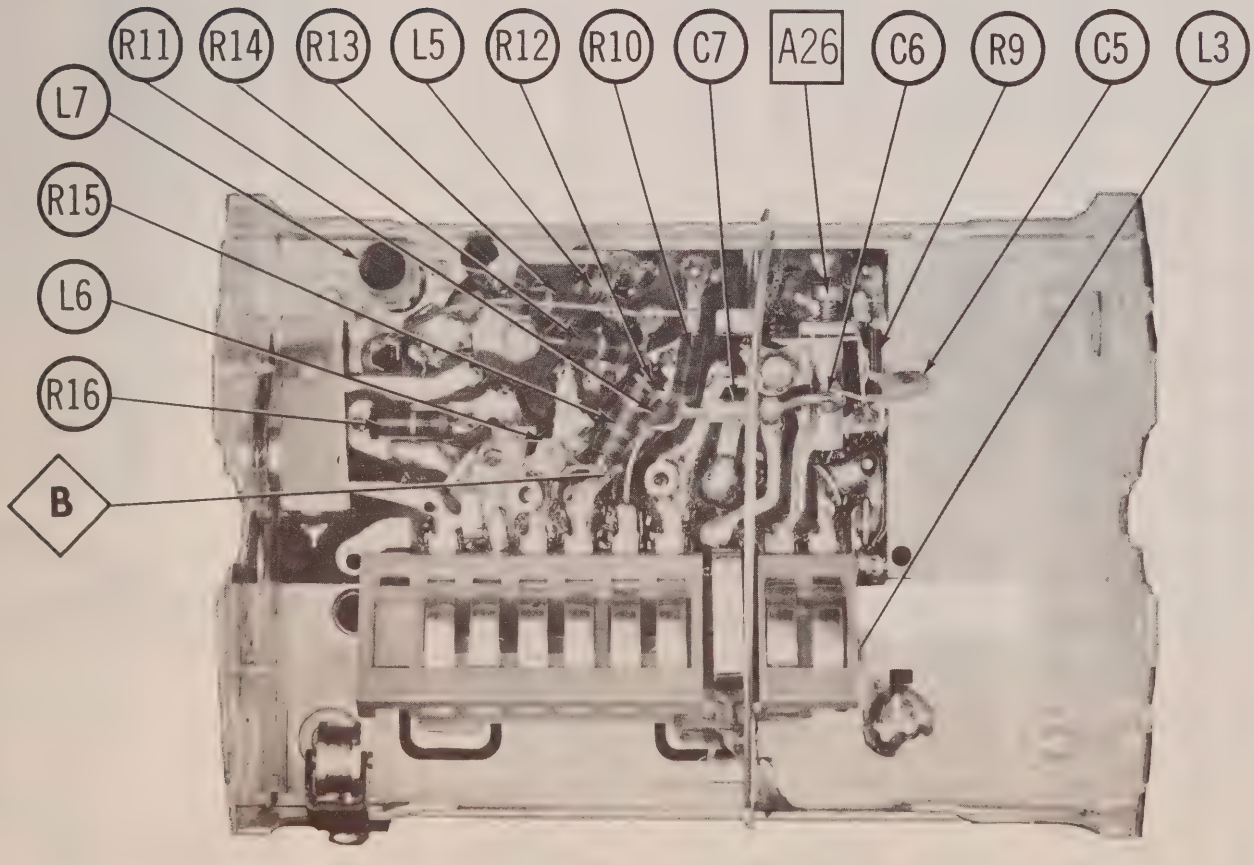


RF TUNER-TOP VIEW



RF TUNER-BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	R.F Amplifier	6BN4	
V2	Mixer-Oscillator	6CG4	
V3	1st Video IF Amplifier	6CB6	
V4	2nd Video IF Amplifier	6CB6	
V5	3rd Video IF Amplifier	6CB6	
V6	Video Output-Sound IF Amp.	6AU8	
V7	Audio Detector	6BH6	
V8	Audio Output	6AQ5	

ITEM No	USE	TYPE	NOTES
V9	Noise Limiter-Sync Sep.	6BU8	
V10	Vert Mult.-Vert. Output	6CM7	
V11	Horiz. Phase Det.- Horiz. AFC	6CM7	
V12	Horiz Osc. -Horiz. Disch.	6CX7	
V13	Horiz. Output	6DQ8	
V14	Damper	6AX4GT	
V15	HV Rectifier	1B3GT	
V16	LV Rectifier	5U4GA	

PICTURE TUBE

ITEM No	REPLACEMENT DATA				NOTES
	ZENITH PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V17	21AL P4B	21AL P4B ③	21AP4A, B	21ALP4A, B ①	① Silver Screen "85" ② Aluminized
	21AL P4A	21AL P4A ③	21AP4A ②		
	21AL P4	21AL P4	21AP4		
	24DP4A	24DP4A ③		24DP4A ② 24DP4	

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA						
	CAP	VOLT	ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	⌀40	400	23-2743	APH4-37-95	CU690	FP328-4	TMD-55	Q-025	TVL-3683
B	⌀30	400				TC68	TD-60-350	MT-0550	
C	⌀50	50							
C1A	⌀4	350	23-2744	APH3-180		FP331-3		D-345	TVL-3719
B	⌀40	400				TC80		MT-4504	
C	30	25							
C3	10	400	23-2270 (Note 1)	NP-PR3404 + VNP10	BR3045 + BR3045	TC75 TC75		MT-4530 MT-4530	R2286 *
C4	10	350	23-2740(Note 3)	PR3350V10	BR3250	TC83	TD-12-350	FM-3512	TVA-1504

Note 1. Non-polarized unit.
Note 2. Used only in chassis 17233Q.
† Connect negative leads together.
* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP	VOLT	ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C5	5		23-2913							
C6	1-4.5		23-2909							
C7	47		23-2917							
C8	10000		23-2	BPD-01	DD-103	KD62	ED-01	DC-511	5HK-81	
C9	10		23-2731							
C10	470		23-6	BPD-00047	DD-471	KD60	ED-470	UC-5347	5GA-T47	
C11	8		23-2481	NPD-D8.2		Z015	TCD-8.2			
C12	470		23-16	BPD-00047	DD-471	KD60	ED-470	UC-5347	5GA-T47	
C13	1000		23-17	BPD-001	DD-102	KD69	ED-001	DC-531	5HK-DA	
C14	470		23-16	BPD-00047	DD-471	KD60	ED-470	UC-5347	5GA-T47	
C15	10		23-2396	BPD-001	DD-102	KD69	ED-001	DC-531	5HK-DA	
C16	1000		23-2397	BPD-001	DD-102	KD69	ED-001	DC-531	5HK-DA	
C17	330	500	23-266	BPD-00033	DD-331	G056	ED-330	UC-5333	5GA-T33	
C18	1000		23-17	BPD-001	DD-102	KD69	ED-001	DC-531	5HK-DA	
C19	10000		23-2	BPD-01	DD-103	KD62	ED-01	DC-511	5HK-81	Note 3
C20	4.7		23-2867							
C21	4700		23-14	BPD-0047	DD-472	KD79	ED-0047	UC-5247	5HK-D47	
C22	47		23-2467							
C23	10000		23-2	BPD-01	DD-103	KD62	ED-01	DC-511	5HK-81	
C24	.1	200	23-1777	P288N-1	DF-104	CUB2P1		GEM-201	2TM-P1	
C25	.033	600	23-2350							
C26	33	200	23-2780	P388N-1	DF-104	CUB2P1		GEM-201	2TM-P1	
C27	10000		23-2	BPD-01	DD-103	KD62	ED-01	DC-511	5HK-81	
C28	.15	200	23-2352	P388N-15		CUB2P15		GEM-2015	2TM-P15	
C29	100		23-5	BPD-001	DD-101	G042	ED-100	UC-531	5GA-T1	
C30	5		23-2343	NPO-S15.3	TCZ-5R3	TZ06	TCD-3	ZT-553	5TCCD-Y33	
C31	50		23-2480	NPO-S150	TCZ-50	Z034	TCO-50	ZT-551	5TCC-Q6	
C32	3.4		23-2546							
C33A	1000		23-21	BPD-2X001	DD2-102	DH069	ED2-001	DCD-521	5HK-2D1	
B	1000									
C34	7.5		23-2743							
C35	10		23-2731							
C36	470		23-6	BPD-00047	DD-471	KD60	ED-470	UC-5347	5GA-T47	
C37	10000		23-2	BPD-01	DD-103	KD62	ED-01	DC-511	5HK-81	
C38	2300		23-21	BPD-0032	DD-232	K073	ED-0023	UC-5232	5HK-D23	
C39	470		23-6	BPD-00047	DD-471	KD60	ED-470	UC-5347	5GA-T47	
C40	3300		23-11	BPD-0033	D6-332	K077	ED-0033	UC-5233	5GA-D33	
C41	10000		23-2	BPD-01	DD-103	KD62	ED-01	DC-511	5HK-81	
C42	033	400	23-2635							
C43	01	300	23-2045	1464-01		1DR3M2			M8-1J	
C44	.1	400	23-2081	P468N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C45	.0047	600	23-1849	1484-0047		1RS D47			M8-247	
C46	.047	200	23-2792	BPD-05	DF-503	CUB4S47		GEM-4147	4TM-S47	
C47A	51		23-25	NPO-D50	TCZ-51	22R5Z01	TCO-51	ZT-545	M8-451	
B	51			NPO-D50	TCZ-51	22R5Z01	TCO-51	ZT-545	M8-451	
C48	3300		23-18	BPD-0033	D6-332	K075	ED-0023	UC-5232	5GA-D22	
C49A	1000		23-21	BPD-2X001	DD2-102	DH069	ED2-001	DCD-521	5HK-2D1	
B	1000									
C50	01	200	23-1809	BPD-01	D6-103	CUB4Z	GP-10000	GEM-401	4TM-Z1	
C51	.1	200	23-2780	P388N-1	DF-104	CUB2P1		GEM-201	2TM-P1	
C52	680	500	23-2685	1484-00068	D6-681	1RS T68	ED-680		M8-268	
C53	1000	500	23-2353	1484-001		1RS D1	ED-1000	MCD255	M8-25	
C54	1500		23-12	1464-0015		1RS D15	ED-1500	MCD256	M8-215	
C55	1000		23-17	1464-001		1RS D1	ED-1000	MCD255	M8-2	
C56A	1000		23-21	BPD-2X001	DD2-102	DH069	ED2-001	DCD-521	5HK-2D1	
B	1000									
C57	4700		23-14	BPD-0047	D6-472	BYA0D47	GP-4700	UC-5247	5HK-D47	
C58	15	400	23-2261	P468N-15		CUB4P15		GEM-4015	4TM-P15	
C59	10000		23-2	BPD-01	DD-103	KD62	ED-01	DC-511	5HK-81	
C60	145	4000	23-2869							Note 4
C61	56	2000				DD30-560	HD3-56		30GA-Q56	Note 5
C62	.1	600	23-1841	P588N-1		DF-104	CUB6P1	GEM-601	6TM-P1	Note 3

Note 3 Chassis 17220 uses 1000MMF in this application (Part #23-17).
Note 4 Chassis 17232 and 17232Q use 130MMF in this application (Part #23-2807).
Note 5. Used only in Chassis 17233 and 17233Q.
Note 6. Replace with same value.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	63-3636		A47-1Meg-S	QU1-13T	U54	Volume Control - Note 1
B	Shaft		Not Req.		Not Req.	FS-3	Not Req.	Attach to R1A
C	Switch		Not Req.		SWE-13	76-1	US-26	Attach to R1A
R3A	750K	½	63-3673		A8-66	A47-750K-S	QU1-136	U54 Vert. Hold
B	Shaft		Not Req.		A4C-4	RS6-3	Not Req.	Attach to R3A
R3A	70000	2	63-3288		V-136	A43-7000	WPK-7500	R7500L Contrast Control
B	Shaft		Not Req.		Not Req.	FS-3	QS-38	Attach to R3A
R4A	500K	½	63-3671			B-81	QU4-153	TA8BR Brightness Control
B	Shaft		Not Req.		Not Req.	Not Req.	WPK-500	Attach to R4A
R5A	7.5Meg	½	63-3294		A8-89	A47-7.5Meg-S	QU1-143	*PTA855L Height Control
	With 1Meg assy							
B	Shaft		Not Req.		AK-18	RM-5	TQ	Not Req. Attach to R5A
R8A	350Ω	1	63-3396		A8-9	A47-600-S	QU1-14	PTA352L Vert. Linearity
B	Shaft		Not Req.		AK-18	RM-5	TQ	Not Req. Attach to R8A
R7	750Ω	1	63-3284			3W-800-50		FL750 Buss Control - wire wound
	With (60Ω) assy							
R6A	250K	½	63-3635			QU3-153		AGC Control
B	Shaft					TM1-67T		Attach to R6A

Note 1. Alternate part #63-3668 used in Chassis 17232.
* Connect a 1Meg resistor in series with the left hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end terminals down).

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R9	4700Ω		63-1813	BTS-4700	
R10	6800Ω		63-1786	BTS-6800	
R11	220K		63-1804	BTS-220K	
R12	1800Ω		63-1810	BTS-1800	
R13	1000Ω		63-1785	BTS-1000	
R14	10K		63-1818	BTS-10K	
R15	68000Ω		63-1826	BTS-68000	
R16	10K		63-1818	BTS-10K	
R17	470K		63-1808	BTS-470K	
R18	1Meg		63-1811	BTS-1Meg	
R19	130K		63-1873	BTS-130K	Note 6
R20	1000Ω		63-1785		Note 1
R21	39K		63-1853		
R22	47K		63-1845		
R23	1000Ω		63-1785	BTS-1000	Note 6
R24	56Ω		63-1733	BTS-56	
R25	130K		63-1873		
R26	130K		63-1873		
R27	3300Ω		63-1807		
R28	1000Ω		63-1785	BTS-1000	Note 6
R29	470Ω		63-1771	BTS-470	
R30	130Ω		63-1747	BTS-130	
R31	4700Ω		63-1814		
R32	47K		63-1845		
R33	2300Ω		63-1799	BTS-2300	
R34	4700Ω		63-1814	BTS-4700	
R35	47Ω		63-1732	BTS-47	
R36	47000Ω	4	63-3675	Note 7	
R37	47000Ω	4	63-3675	Note 7	
R38	1.5Meg		63-1815	BTS-1.5Meg	
R39	1800Ω		63-1798	BTS-1800	
R40	39K		63-1853	BTS-39K	
R41	68K		63-1863	BTS-68K	
R42	470K		63-1808	BTS-470K	
R43	100K		63-1859	BTS-100K	
R44	100K		63-1859	BTS-100K	
R45	33K		63-1848	BTS-33K	
R46	680Ω		63-1778	BTS-680	
R47	22K	3	63-1866	BTS-22K	
R48	390 K		63-1884	BTS-390K	
R49	470Ω		63-1771	BTS-470	
R50	680Ω	1	63-3290	BTA-680	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R51	2.7Meg		63-1828	BTS-2.7Meg	
R52	680K		63-1804	BTS-680K	
R53	180K		63-1880	BTS-180K	
R54	180K		63-1880	BTS-180K	
R55	2.2Meg		63-1825	BTS-2.2Meg	
R56	3.3Meg		63-1833	BTS-3.3Meg	
R57	82K		63-1868	BTS-82K	
R58	100K		63-1859	BTS-100K	
R59	3.3Meg		63-1833	BTS-3.3Meg	
R60	390K		63-1884	BTS-390K	
R61	33K		63-1848	BTS-33K	
R62	330K		63-1890	BTS-330K	
R63	82K		63-1868	BTS-82K	
R64	100K		63-1859	BTS-100K	
R65	2.2Meg		63-1825	BTS-2.3Meg	
R66	330Ω		63-1754	BTS-220	
R67	1000Ω	1	63-3685	BTA-1000	
R68	33K		63-1841	BTS-33K	
R69	390Ω				
R70	390Ω		63-1898		Note 3
R71	470K		63-1811		
R72	1Meg		63-1760		
R73	330Ω		63-1811		
R74	1Meg		63-1953		
R75	10Meg		63-1963		
R76	10Meg		63-1953		
R77	47K	1	63-1184		
R78	10K	3	63-2145		
R79	560Ω		63-1775		
R80	22K		63-1841		
R81	68K		63-1863		
R82	180K	1	63-2313		
R83	22K		63-1841		Note 8
R84	470K		63-1899		
R85	100Ω		63-1744		
R86	100Ω		63-1744		
R87	10K	4	63-3623	PW10-10K	
R88	10K	4	63-3623	PW10-10K	
R89	22K		63-1841	BTS-22K	
R90	330K		63-3907	BTS-330K	
R91	680Ω	1	63-3290	BTA-680	Note 4
R92	3Ω			SWI-3.3	Note 9

Note 1. Used in Chassis 17220 only
Note 2. Used in Chassis 17232, 17232Q only.
Note 3. Not used in some versions
Note 4. Used in Chassis 17233Q only.
Note 5. A 100K used in Chassis 17220 only.
Note 6. A 150ΩΩ/W used in Chassis 17235, 17235Q only.
Note 7. A 36500Ω @10W used in Chassis 17235, 17235Q only.
Note 8. A 15K used in Chassis 17233, 17233Q only.
Note 9. Resistance of RF rectifier filament leads (#30 advance resistance wire) may be replaced with standard HV filament wire and a 3.3Ω resistor.

TRANSFORMER (POWER)

ITEM No	RATING				REPLACEMENT DATA					
	PRI	SEC. 1	SEC. 2	SEC. 3	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC	350VCT	5V	6.3V	95-1501 ①					
	2.1-.46A	2.340A	2.5A	2.5A	95-1491 ②					
					95-1530 ①					
					95-1499 ②					
					95-1507 ①					
					95-1521 ②					
					95-1528 ①					
					95-1529 ②					
					95-1530 ①					
					95-1531 ②					
					95-1523 ①					
					95-1533 ②					

① Used in some versions of Chassis 17220, 17221, 17223.
② Used in some versions of Chassis 17223
③ Used in some versions of 17223Q.
④ Used in some versions of 17233Q.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA								
		ZENITH PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Horiz Output Trans	S-40124-1 ① 2 ② S-23995 ③ 4 ④				81F7 ③			
		S-24095 ③ 4 ④ G-40125 ③ 4 ④							
T3	Vert. Output Trans	95-1475 ② 95-1476 ③	Z9005 ①	A-3039 ②		V3I2 ③	A-8141 ④	26854 ②	A-109X ① ③
T4A	Yoke (80°) Horiz (13MH)	DF606 ①	MDF-81 ①	23TD1 ②	Y90P12.47 ③	DY-13A	Y-14 ①	Y-460 ①
B	Vert. (49MH)	95-1452 ① ②	MDF-82 ①	23TD2 ②	Y90P12.71 ③	DY-43 ②	Y-14 ②	Y-461 ②

① Complete assembly. Includes: Winding and terminal assembly, Zenith Part #6-23451.
Tertiary winding and terminal assembly, Zenith Part #6-34432.
② Used in Chassis 17230, 17231 and 17232, Q
③ Used in Chassis 17233, Q
④ Complete assembly. Includes: Winding and terminal assembly, Zenith part #6-23451.
Tertiary winding and terminal assembly, Zenith part #6-34094
⑤ Use 15 to 1 turns ratio.
⑥ Connect as auto transformer
⑦ Drill new mounting hole(s)
⑧ Includes capacitor C61. Resistors R69 and R70.
⑨ Connect horizontal yoke damping network across terminals #3 and #7
⑩ Use original yoke damping network, if necessary

***HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA**

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
4				4			
3				3			
2				2			
1				1			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T5	10.5K	3-4Ω	95-1485	E3117	A-3923	A-3879	34893	S-17X	

SPEAKER

ITEM No.	RATINGS				REPLACEMENT DATA			NOTES
	SIZE	FIELD	V C.	IMP	ZENITH PART No.	QUAM PART No.	RCA TYPE No.	
SP1	5-1.4	PM		3-4Ω	49-751 ①	8SA1	8T92	② One used in Models 21320R, RU, 21320Y, YU, 21323R, RU, 21323E, EU 21323Y, YU, 21323C, CU, 23000R, RU, 23000E EU; two used in Models 23017R, RU, 23017E, EU, 23017Y, YU
	6	PM		3-4Ω	49-752 ①	8A3U	20863	③ Used in Models 23347R, RU, 23347E, EU, 23347U, YU, 23004R,RU, 23004E,EU
	10"	PM		3-4Ω	49-753 ①	10A3U	23461	④ Used in Models 23258R, RU, 23258E, EU, 23258U, YU, 23008R, RU, 23008E, EU, 23008R. RU, 23008E, EU
					49-754 ①	10A3U2.2		⑤ Used in Models 23283R, RU, 23283E, EU
					49-755 ② ③ ④			⑥ Used in Models 23673R, RU, 23673E, EU
					49-853 ⑤ ⑥			⑦ Used in Models 24000R, RU, 24000E, EU
								⑧ Used.
								⑨ Electrostatic type speaker

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA	
		ZENITH PART No.	NOTES
L1	Ant. Matching Trans.	S-40488	
L3	IF Trap Coil	20-857	Channel 8
L4	IF Trap Coil	S-40497	
L4A	Ant., RF, Mixer Grid & Osc. Coils	S-40478	Channel 8
L5	IF Trap Coil	S-40479	Channel 9
L6	Ant., RF, Mixer Grid & Osc. Coils	S-40480	Channel 10
L7	Ant., RF, Mixer Grid, & Osc. Coils	S-40481	Channel 11
L8	Ant., RF, Mixer Grid & Osc. Coils	S-40483	Channel 12
L9	Ant. RF Mixer Grid & Osc. Coils	S-40483	Channel 13
L5	Mixer Screen Regenerator Coil	20-856	
L6	Osc. Plate Choke	20-855	
L7	Conv. Plate	S-40498	

ITEM No.	USE	DC RES.		ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
		PRI.	SEC.					
L8A	1st. Video IF	.1Ω		S-24775				Complete assembly
B	47.25MC Trap	0Ω						
C	RF Choke	0Ω						
L9	2nd. Video IF	1Ω	7.3Ω	S-23922				Tapped ⑥.7Ω
L10	Cathode Trap	5.5Ω		S-24080				
L11	3rd. Video IF	.1Ω	.1Ω	S-23923			6139	25 Microhenries
L12	4th. Video IF	.3Ω	.3Ω	S-23940				
L13	Series Peaking Coil	5.8Ω		S-23444		19-5023	4638	25 Microhenries
L14	Shunt Peaking Coil	9.3Ω		S-18015		19-3300	TV-190	33Ω Microhenries
L15A	4.5MC Trap	13Ω		S-23950				
B	1st. Sound IF	1.5Ω						
L16	Series Peaking Coil	8Ω		S-20880		19-3125 *		137 Microhenries, wound on 15K resistor
L17	2nd Sound IF	.2Ω	.5Ω	S-23348				
L18	Quadrature Coil	4.5Ω		S-19030			1480	

* Parallel with 15K resistor.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA							NOTES
	PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	
L19	163Ω		S-19743	19-1577		6324				Tapped @ 63Ω

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L20	.240A	63Ω	1.84 HY	95-1376	C5037①	C-2996 ①	C-2326①	26C44	C-23X

① Drill one new mounting hole.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ZENITH PART No.	REPLACEMENT DATA
K1	Vert. Integrator		87-5	
K2	Vert. Multivibrator Coup.		87-4	

FUSES

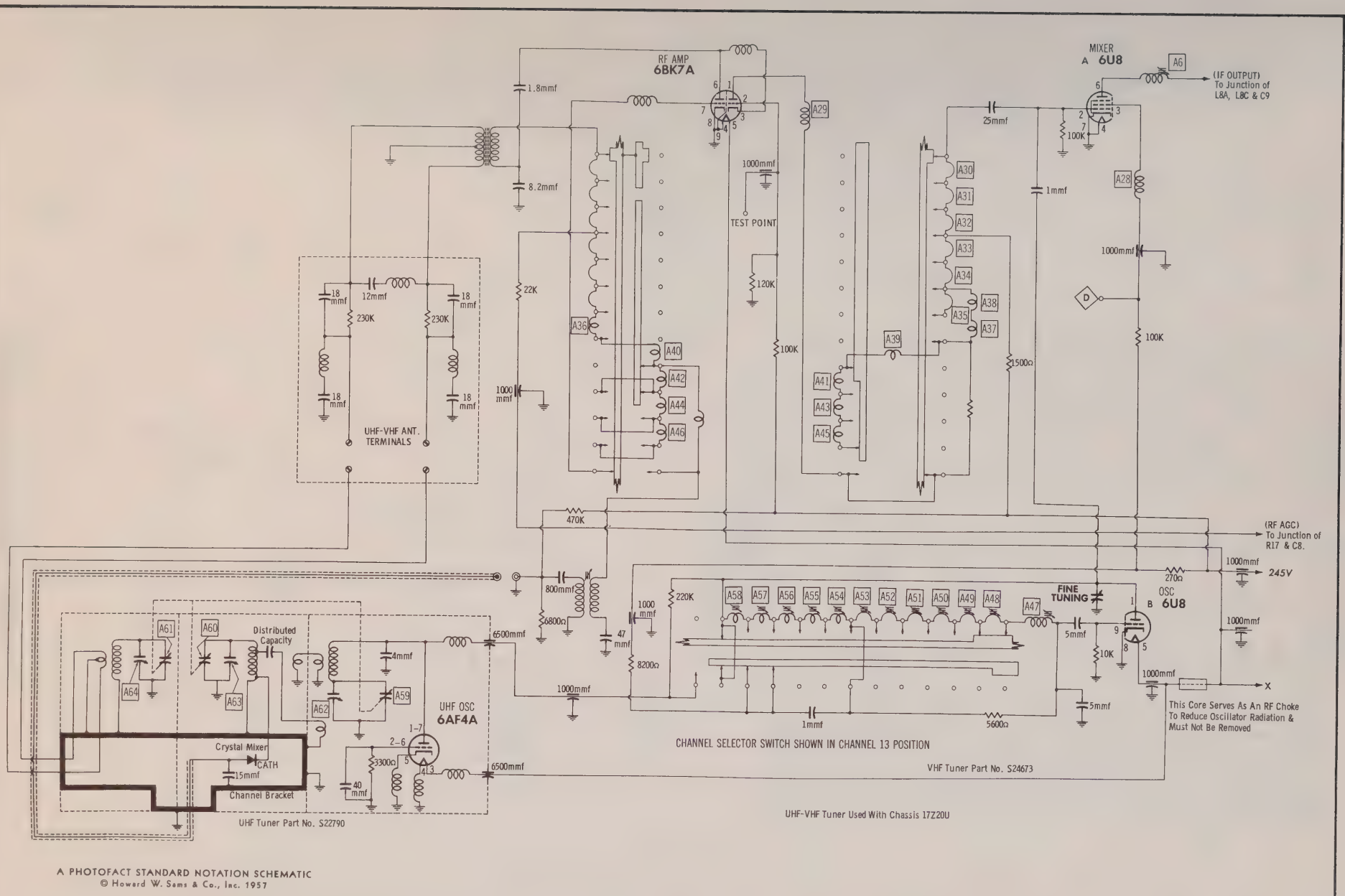
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ZENITH PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	N	1/4A 125V	136-33		333.250 (N 1/4A)	346008	N 1/4	HN 0 to 3/10

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		ZENITH PART No.	SYLVANIA PART No.	
M2	1N64	103-18	1N64	Video Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Pilot Lamp	100-198	#47
M4	Tuner	S-24782	VHF - Models Z2222C, Y, E, R, Z2247R, E, H, Z2258R, E, H, Z2282R, E, Z2637R, E, Y, Z2672E, R
	Tuner	S-24783	VHF - Models Z2222CU, YU, EU, RU, Z2247RU, EU, HU, Z2258RU, EU, HU, Z2282RU, EU, Z2637RU, EU, YU, Z2672EU, RU
	Tuner	S-24672	VHF - Models Z2220R, Y
	Tuner	S-24673	VHF - Models Z2220RU, YU
	Tuner	S-22790	UHF - Models Z2220RU, YU, Z2222CU, YU, EU, RU, Z2247RU, EU, HU, Z2258RU, EU, HU, Z2282RU, EU, Z2637RU, EU, YU, Z2672EU, RU
	Tuner	S-24792	VHF - Models Z3000R, E, Z3004R, E, Z3006R, E, Z3008R, E, Z4000R, E
M5	Width Adjustment		Brass Sleeve
M6	Centering Device	S-22560	
M7	Ion Trap	S-17164	
	Trap Assy.	S-23232	Part of Tuner S-24672
	Trap Assy.	S-23233	Part of Tuner S-24673
	Knob	46-1539	On-off-volume - Models Z2220R, RU, Y, YU
	Knob	46-1541	On-off-volume - Models Z2222R, RU, Y, YU, C, CU Z2247R, RU, Z2258R, RU, Z2282R, RU, Z2637R, RU, Y, YU, Z2672R, RU, Z3000R, RU, Z3004R, RU, Z3006R, RU, Z3008R, RU, Z4000R, RU
	Knob	46-1585	On-off-volume - Models Z2222E, EU, Z2247E, EU, H, HU, Z2258E, EU, H, HU, Z2282E, EU, Z2637E, EU, Z2672E, EU, Z3000E, EU, Z3004E, EU, Z3006E, EU, Z3008E, EU, Z4000E, EU
	Knob	46-1542	Channel Selector - Models Z2220R, RU, Y, YU
	Knob	S-24855	Channel Selector - Models Z2222R, RU, Y, YU, C, CU, Z2247R, RU, Z2258R, RU, Z2282R, RU, Z2637R, RU, Y, YU, Z2672R, RU, Z3000R, RU, Z3004R, RU, Z3006R, RU, Z3008R, RU, Z4000R, RU
	Knob	S-24875	Channel Selector - Models Z2222E, EU, Z2247E, EU, H, HU, Z2258E, EU, H, HU, Z2282E, EU, Z2637E, EU, Z2672E, EU, Z3000E, EU, Z3004E, EU, Z3006E, EU, Z3008E, EU, Z4000E, EU
	Knob	S-22863	Fine tuning - Models Z2220R, RU, Y, YU
	Knob	S-24866	Fine tuning - Models Z2222R, RU, E, EU, Y, YU, C, CU, Z2247R, RU, E, EU, H, HU, Z2258R, RU, E, EU, H, HU, Z2282R, RU, E, EU, Z2637R, RU, E, EU, Y, YU, Z2672R, RU, E, EU
	Knob	S-22408	Fine tuning - Models Z3000R, RU, E, EU, Z3004R, RU, E, EU, Z3006R, RU, E, EU, Z3008R, RU, E, EU, Z4000R, RU, E, EU
	Knob	S-22025	UHF Dial - Models Z2220RU, YU, Z2222RU, EU, YU, CU, Z2247RU, EU, HU, Z2258RU, EH, HU, Z2637RU, EU, YU, Z2672RU, EU
	Knob	S-22048	UHF Dial - Models Z2282RU, EU
	Knob	S-24848	Horiz. Hold, Contrast - Models Z2220R, RU, Y, YU, Z2222R, RU, Y, YU, C, CU
	Knob	S-24842	Horiz. Hold, Contrast - Models Z2222E, EU
	Knob	S-24914	Vert. Hold, Brightness - Models Z2220R, RU, Y, YU, Z2222R, RU, Y, YU, C, CU
	Knob	S-24915	Vert. Hold, Brightness - Models Z2222E, EU
	Knob	S-24912	Horiz. Hold, Vert. Hold, Brightness, Contrast - Models Z2247R, RU, Z2258R, RU, Z2282R, RU, Z3000R, RU, Z3004R, RU, Z3006R, RU, Z3008R, RU
	Knob	S-24913	Horiz. Hold, Vert. Hold, Brightness, Contrast - Models Z2247E, EU, H, HU, Z2258E, EU, H, HU, Z2282E, EU, Z3000E, EU, Z3004E, EU, Z3006E, EU, Z3008E, EU
	Knob	S-24847	Horiz. Hold, Vert. Hold, Brightness, Contrast - Models Z2237R, RU, Y, YU, Z2672R, RU, Z4000R, RU
	Knob	S-24841	Horiz., Vert. Hold, Brightness, Contrast - Models Z2637E, EU, Z2672E, EU, Z4000E, EU



A PHOTOFACT STANDARD NOTATION SCHEMATIC
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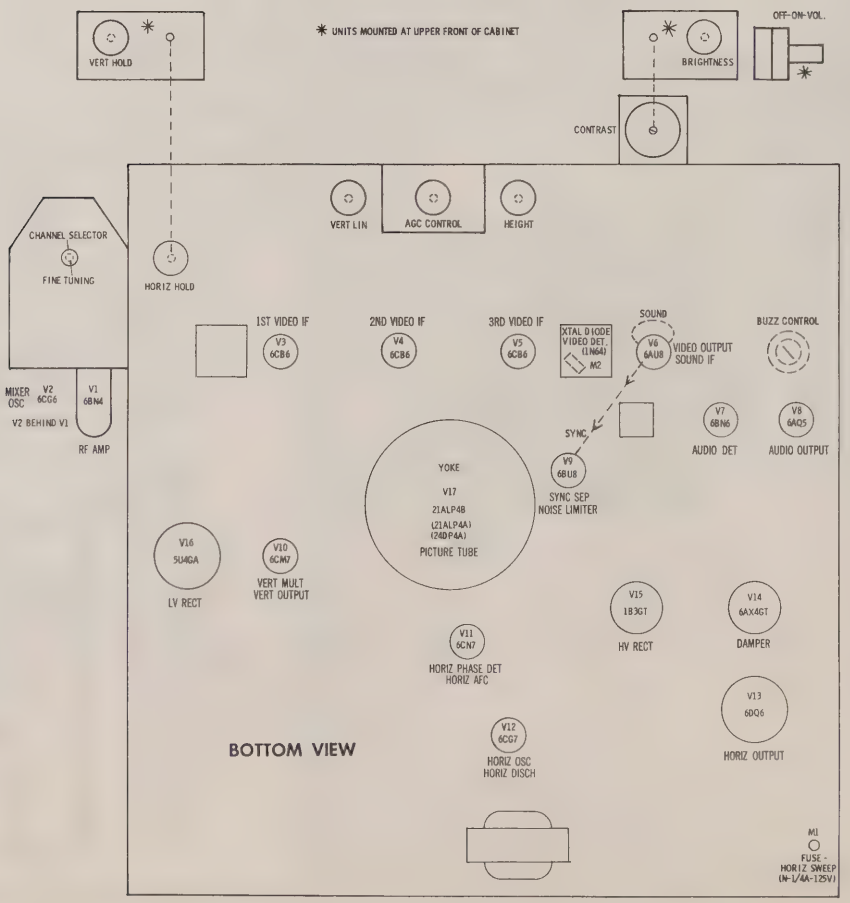
ALTERNATE VHF-UHF TUNER SCHEMATIC

ZENITH MODELS Z2220R, RU, Y, YU, Z2222C, CU, E, EU, R, RU, Y, YU, Z2247E, EU, H, HU, R, RU, Z2258E, EU, H, HU, R, RU, Z2282E, EU, Z2637E, EU, R, RU, Y, YU, Z2672E, EU, R, RU, Z3000E, EU, R, RU, Z3004E, EU, R, RU, Z3006E, EU, R, RU, Z3008E, EU, R, RU, Z4000E, EU, R, RU (Ch. 1722O, 1722I, 1722J, 1722QA, 1722J, 1722JQ)

RESISTANCE MEASUREMENTS

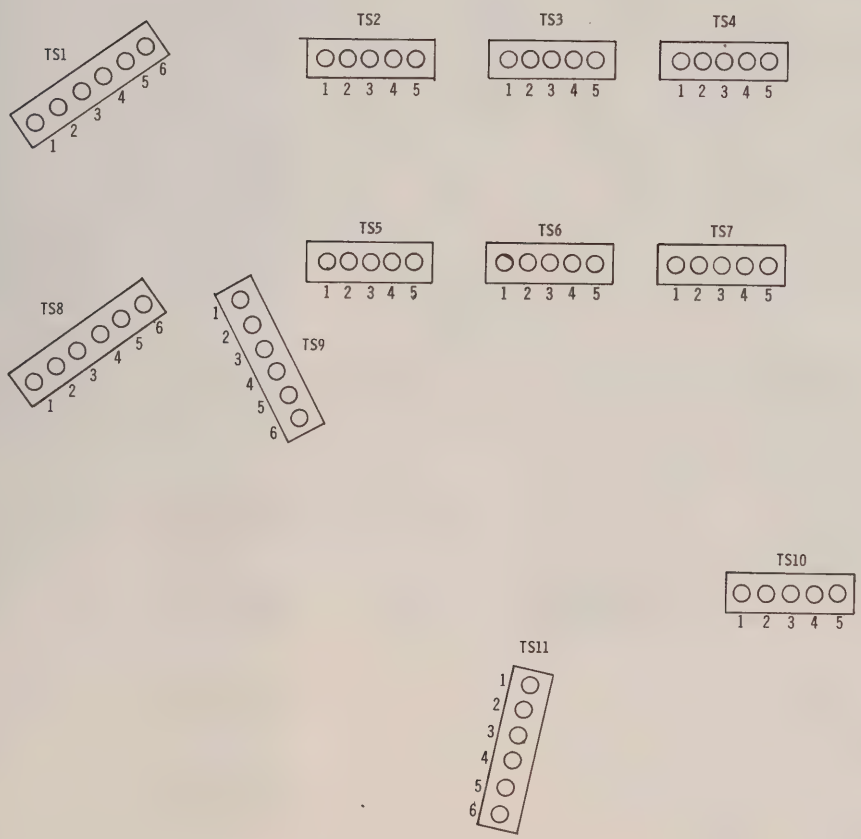
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BN4	0Ω	2Meg	0Ω	.1Ω	† 350Ω	0Ω	2Meg		
V2	6CG8	10K	† 10K	0Ω	0Ω	.1Ω	† 3500Ω	† 12K	0Ω	224K
V3	6CB6	1.5Meg	56Ω	0Ω	.1Ω	▲ 1000Ω	▲ 1000Ω	0Ω		
V4	6CB6	▲ 3300Ω	▲ 4.8Ω	0Ω	.1Ω	† 1000Ω	† 1000Ω	700K		
V5	6CB6	.1Ω	120Ω	.1Ω	0Ω	† 2700Ω	† 2700Ω	0Ω		
V6	6AU8	0Ω	100K	† 51K	0Ω	.1Ω	47Ω	4700Ω	† 4700Ω	† 8200Ω
V7	6BN6	340Ω	.7Ω	.1Ω	0Ω	† 22K	4.5Ω	† 430K		
V8	6AQ5	100K	680Ω	0Ω	.1Ω	† 1350Ω	† 500Ω	100K		
V9	6BU8	0Ω	† 9000Ω	† 53K	0Ω	.1Ω	3.3Meg	† 3Meg	† 1.7Meg	220K
V10	6CM7	▰ 11.7K	TP	0Ω	0Ω	.1Ω	▰ 3.7Meg	600K	2.2Meg	2500Ω
V11	6CN7	2200Ω	2Meg	1Meg	0Ω	.1Ω	560Ω	6Meg	† 47K	NC
V12	6CG7	▰ 180K	68K	0Ω	0Ω	.1Ω	† 65Ω	30K	10.5K	NC
V13	6DQ6	TP	.1Ω	TP	† 10K	470K	TP	0Ω	0Ω	TOP CAP ▰ 16Ω
V14	6AX4GT	TP	NC	10Meg	NC	† 63Ω	NC	0Ω	.1Ω	
V15	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▰ 296Ω
V16	5U4GA	TP	50K	TP	28Ω	TP	26Ω	NC	50K	
V17	21ALP4B	0Ω	24K	PIN 6 † 65Ω	PIN 10 † 65Ω	PIN 11 150K	PIN 12 .1Ω			

† MEASURED FROM PIN 8 OF V16.
▲ MEASURED FROM PIN 7 OF V4.
▰ MEASURED FROM PIN 3 OF V14.
NC NO CONNECTION.
TP TIE POINT

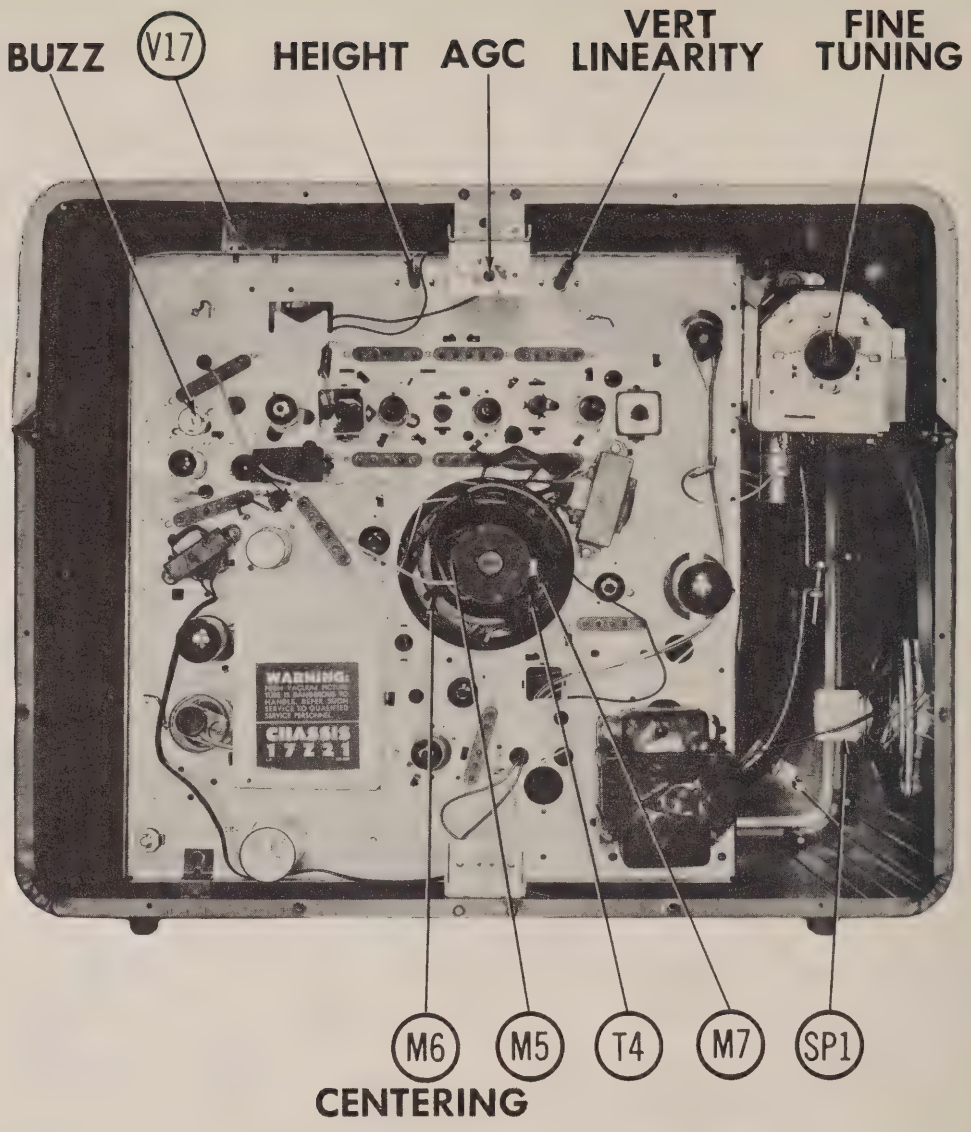


TUBE PLACEMENT CHART

PROPERTY OF
[illegible]NSHIP.
[illegible]DE ST.
[illegible], COLORADO.



TERMINAL LOCATION CHART



CABINET—REAR VIEW

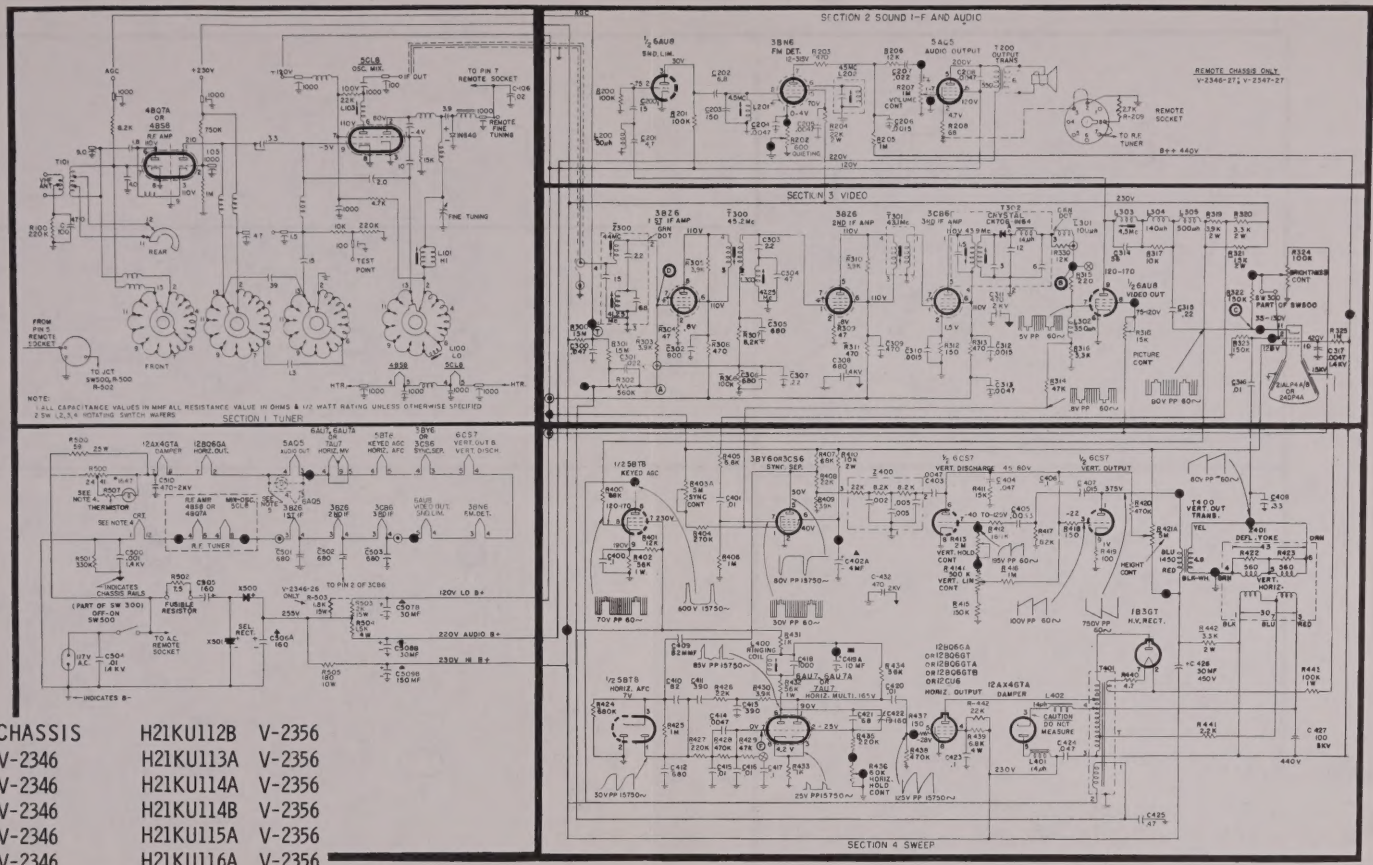
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Adjust the horizontal hold control until the picture synchronizes horizontally.

Switch off channel and back again. If the picture does not fall back in sync, SLIGHTLY readjust the horizontal hold control until it does. Repeat until the picture remains in sync when the channel selector is switched off channel and back.

Adjust the brass width sleeve located on the neck of the picture tube for a picture slightly wider than necessary to fill the picture mask horizontally.


SECTION 1 TUNER
SECTION 2 SOUND I-F AND AUDIO
SECTION 3 VIDEO
SECTION 4 SWEEP
NOTE:
ALL CAPACITANCE VALUES IN MMF ALL RESISTANCE VALUE IN OHMS & 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED
2 SW. (2,3,4 ROTATING SWITCH WAFERS

MODELS	CHASSIS				
H21K112A	V-2346	H21KU112B	V-2356		
H21K112B	V-2346	H21KU113A	V-2356		
H21K113B	V-2346	H21KU114A	V-2356		
H21KR113A	V-2346	H21KU114B	V-2356		
H21KR114A	V-2346	H21KU115A	V-2356		
H21KR115A	V-2346	H21KU116A	V-2356		
H21KR116A	V-2346	H21T101B	V-2346	H21TU101A	V-2356
H21KU112A	V-2356	H21T107B	V-2346	H21TU107B	V-2356
		H21T108B	V-2346	H21TU108B	V-2356

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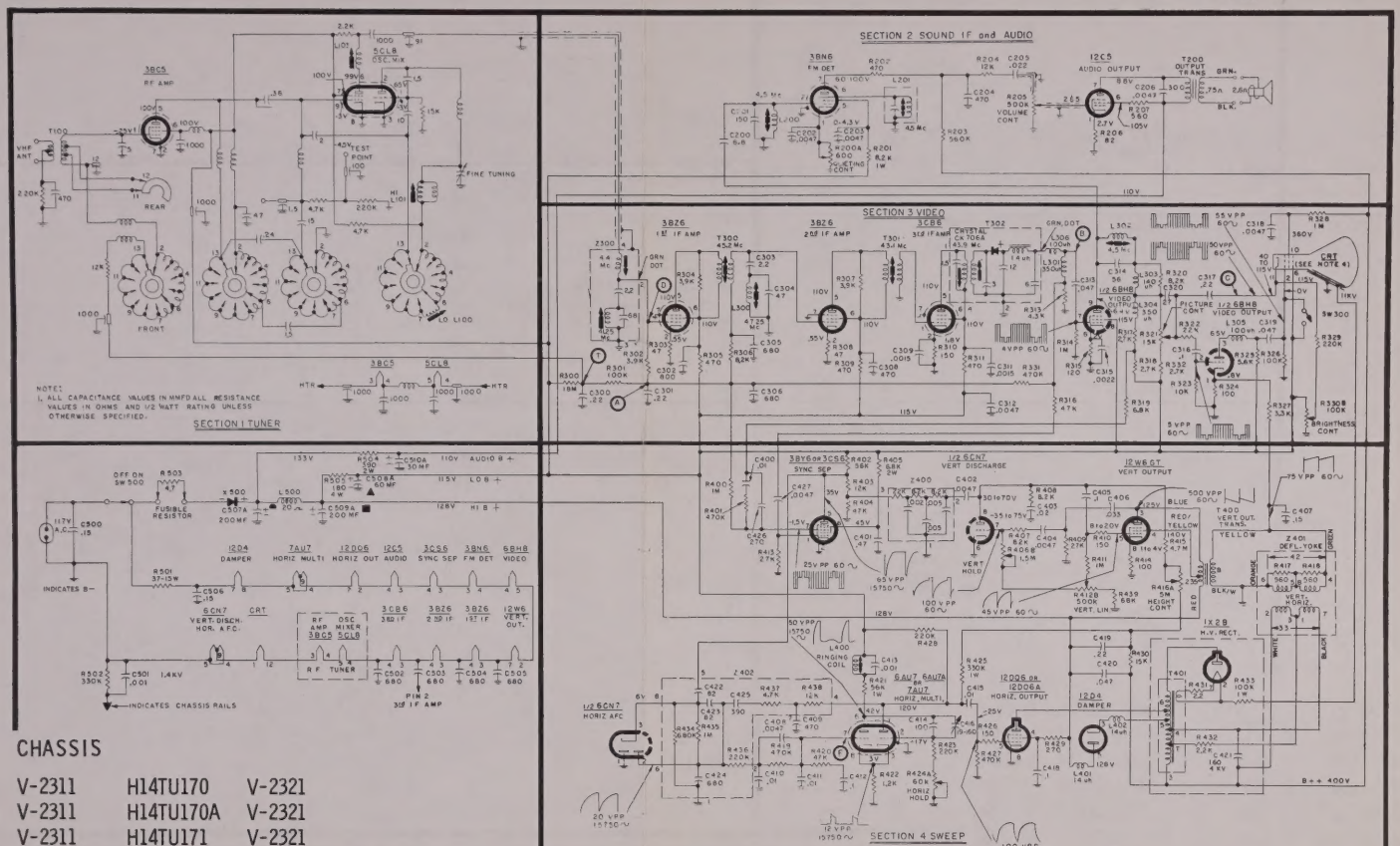

MODELS	CHASSIS		
H14T170	V-2311	H14TU170	V-2321
H14T170A	V-2311	H14TU170A	V-2321
H14T171	V-2311	H14TU171	V-2321
H14T171A	V-2311	H14TU171A	V-2321
H14T172	V-2311	H14TU172	V-2321
H14T172A	V-2311	H14TU172A	V-2321

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